COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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Forecast

- *Rising DP Budgets*
- *Behavioral Skills in MIS*
- *The New DP Moguls*
- *The Rocky Road to OA*

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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. . . Business Prepares to Embrace MIS

Coming Soon . . .

MIS

By Brad Schultz
CW New York Bureau

Have management information systems (MIS) really arrived? Many executives now bear the title "MIS manager," but a number of experts in the technologies of information processing have suggested that true MIS have yet to be installed. Therefore, true MIS management has yet to begin, according to these specialists.

The debunkers insist that MIS feature nearly universal interconnectivity among processing equipment. In true MIS, they assert, virtually any processing device can pass data with electronic dispatch to virtually any other processing device. There are signs as 1981 ends that smooth links among previously incompatible equipment brands will be commercially available within the next few years.

The most conspicuous indication comes from AT&T, which recently announced impending formation of a separate unregulated subsidiary (widely known as "Baby Bell") that will market the long-awaited Advanced Communications Services (ACS). In rough terms, the user will be able to plug virtually any brand of commercially available terminal into the ACS network and communicate with virtually any brand of terminal or computer system elsewhere in the U.S., according to Bell spokesmen.

Behind what the Boston-based Yankee Group called a "grey cloud" at the heart of such networking, AT&T is promising to end major obstacles to implementing multivendor data communications. Within the grey cloud, the world's largest telecommunications supplier would translate the protocols of one equipment brand to protocols of another — at, some Bell watchers predict, low start-up costs for ACS subscribers.

If it really comes, ACS would be a godsend to MIS managers, experts have suggested, because the MIS department is supposed to consolidate corporate control over processing throughout the organization. That has been difficult in large firms where departments have implemented disparate brands of computer systems. Companies have had trouble trying to avoid multivendor implementations that arise from mergers and acquisitions or through the reshuffling of internal departments.

Another sign of approaching universal interconnectivity comes from the Defense Department [CW, Dec. 7]. Several software houses have tested and may soon offer Pentagon-sponsored data network protocols believed to allow such interconnectivity. The Transmission Control Protocol and Internet Protocol will come with popular computer systems in 1982, informed sources predict.

For years, lack of standardization in protocols and communications interfaces has hampered efforts to construct what management scientists call decision support systems (DSS). With DSS, computer resources are packaged as tools for improving decision making in the organization.

The difference between DSS delivered by the MIS department to end users and conventional DP services seems to be based on the former's universality of delivery; its interactive, end-user-oriented nature; and its richness of technological integration.

The universality of delivery amounts to having a terminal on the desk of virtually everyone who participates nontrivially in decision-making processes. With DSS, electronic mail would flow among all these terminals; the

Brad Schultz is senior editor of management at Computerworld.

mail would be appendable to computer-stored data bases and each terminal would be able to retrieve information from the data bases for insertion in reports. This would be impossible in large dispersed organizations without the transparently executed protocol conversions that AT&T's ACS and similar services are supposed to provide.

The interactive end-user-oriented nature of DSS is feasible with new high-level and pseudonatural languages, menu-driven software and speech recognition/synthesis peripherals. However, experts in natural language processing told a number of conferences this year that their field, about 20 years old, is far from producing systems with humanlike capabilities for extended conversations [CW, Nov. 16].

Thus, peripherals are available to mimic the phonemes of human speech and recognize phonemes that humans utter, but the software necessary to generate true dialogue, a la the robot Hal of the film *2001: A Space Odyssey*, is not imminent at the close of 1981. However, it may be on hand by the close of the decade.

Finally, DSS are viewed as integrations of computing, telecommunications and office-related technologies. This year's progress in local network architectures, so-called supercontrollers, which coordinate data, voice, word and video streams, and terminal design are reasons for optimism. But workstations that can handle the full gamut of DSS functions are not yet widely used.

MIS as 'Information Providers'

Studies by International Data Corp. (IDC), Framingham, Mass.-based market research company, show that when companies establish MIS departments they usually give these areas more responsibility for analysis and formatting of information than was previously exercised by DP departments. The MIS department typically deals more with non-MIS people than the DP department deals with non-DP people, IDC concluded.

Companies generally view MIS departments as information providers, IDC added, while DP departments are viewed as information processors. The MIS executive — usually a former DP manager — has more visibility in the organization and more contact with top management than the DP manager, IDC observed. But decision making for the MIS department is shared more with non-MIS people than decision making for the DP department is shared with non-DP people.

Over the past few years, the MIS department — in constrast to DP — has less control over its own affairs, but more control over systems applications and operations in end-user departments, IDC maintained.

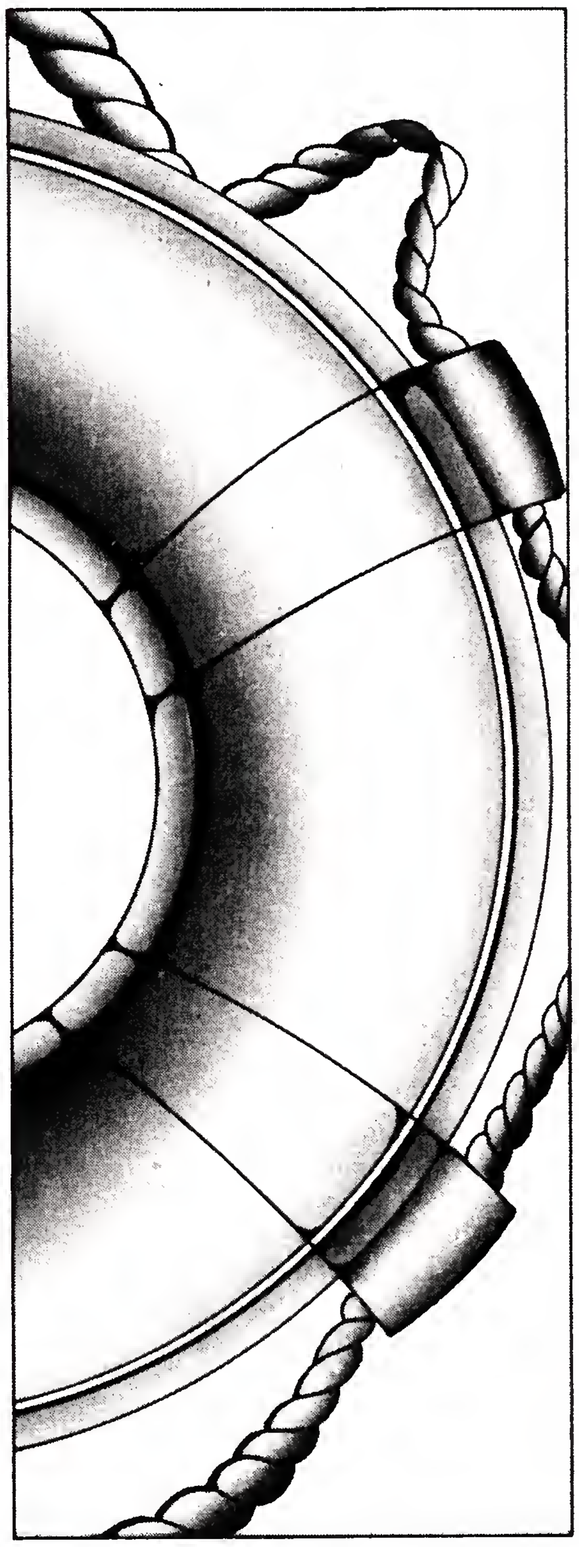
That is what top management wanted. In many board rooms during the late 1970s, DP was seen as a juggernaut rolling out of control.

Establishing MIS gave top management tighter reins on budgeting for systems and — at least temporarily — a better grip on the computing end users began handling by quietly buying cheaper, easier to use hardware. The latter phenomenon, which amounted to an ad hoc decentralization of DP sources, was viewed from the top as erosion of headquarter's influence over activities in the field.

But as 1981 draws to a close, the growing range of sophisticated turnkey processors that end users can purchase out of discretionary funds may defy the MIS department's effort to consolidate computing authority. As the price of powerful multitasking systems sinks below $5,000, end-user hardware procurements will be hard to track, one consultant predicted. Such out-of-pocket computing may not pose a serious budgetary problem to headquarters, but the political influence accruable from end-user processing may irk top brass, he pointed out.

Still, top management has authorized creation of MIS departments for another major reason besides fear of uncontrolled systems spending and usage. To the chagrin of government regulators, computing and telecommunications technologies have become impossible to separate; neither technology can advance without substantial application of the other.

Among vendors, that means major computer manufacturers must com-



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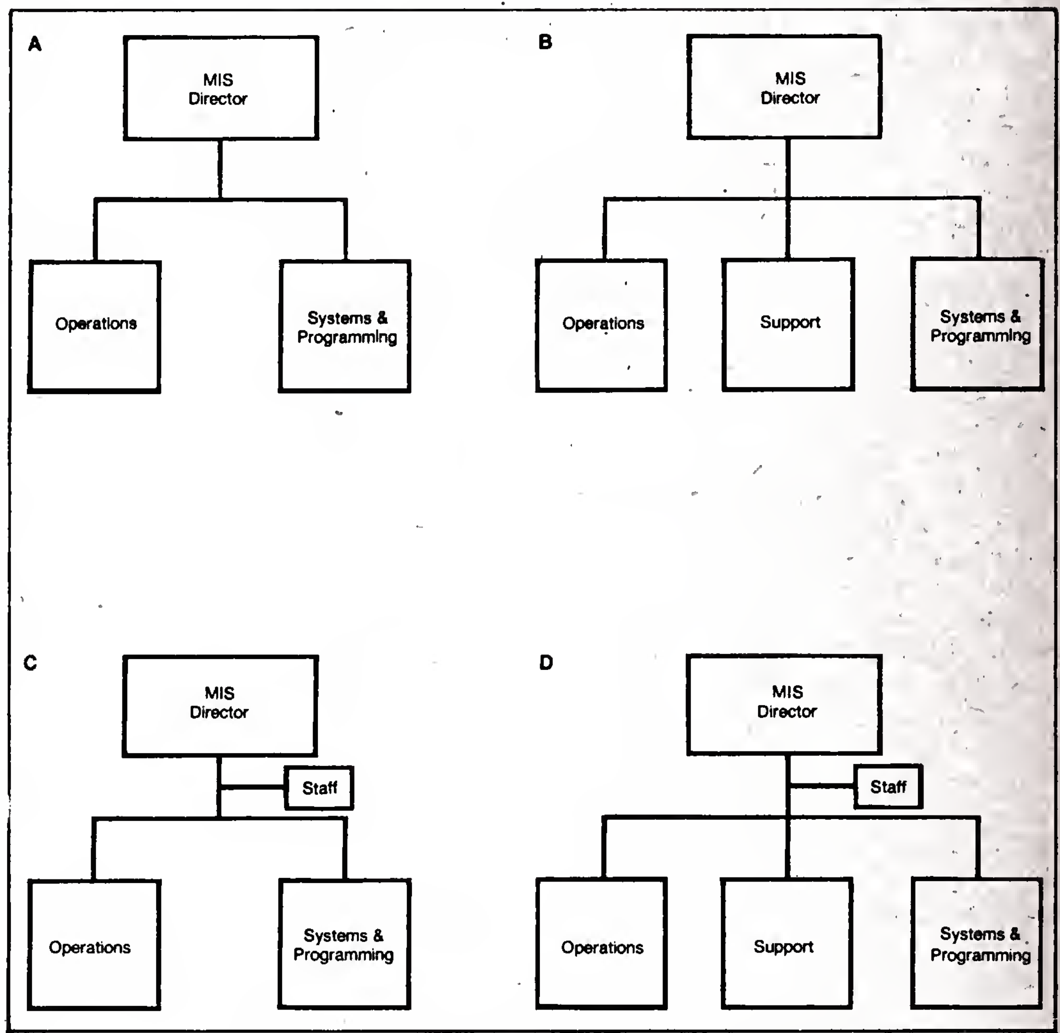
pete or ally themselves with major telecommunications suppliers. Among users, it means ultimate authority over computing must entail ultimate authority over telecommunications. The MIS executive is seen as eventually wielding such authority.

According to IDC, the MIS executive's immediate boss is most commonly the chief financial officer, chief operations officer or chief executive officer. Although a number of large companies have put the MIS executive (who is typically a vice-president or senior vice-president) in charge of telecommunications, IDC has found four common configurations of the MIS organization, none of them covering an entity called the telecommunications department (see chart).

The simplest configuration (upper left in the figure) features two sections under the MIS director: computer operations and systems and programming. Most frequently found in smaller organizations, this configuration may divide support functions between the two sections or concentrate them in one of the two, IDC explained.



Source: International Data Corp.

Basic MIS Organizational Configurations

In another configuration (upper right in the figure), support functions comprise a third section under the MIS director. However, companies with this configuration for MIS often retain some support functions in operations and/or systems and programming, IDC stated. Education and standards, for example, may be located within the operations section; data base administration may fall within systems and programming.

In the third and fourth common MIS configurations, a staff group reports directly to the MIS director, assisting his management of operations and systems and programming (lower left in the figure) or operations, support and systems and programming (lower right in the figure).

A typical organization with the lower left configuration might have DP planning and standards as a staff to the MIS director, IDC said, while a production technical support group might be contained in operations and an education group might be contained in systems and programming.

Although joint responsibility for DP and telecommunications may not be featured by the four most common MIS department configurations, a director of top communications managers indicates that the following large companies at least partly enacted such a union: Bache, Citibank, F.W. Woolworth Co., Mobil Oil Corp., Time, Inc., United Airlines, U.S. Steel Corp. and RCA Corp.

A third technology, office automation (OA), was widely discussed this year as falling within the MIS jurisdiction. Office systems driven by mainframes probably will stay under the MIS purview, some consultants said. But most office systems will be stand-alone and end-user-oriented. Operators will not need a computing background; these systems will not

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warrant associated in-house development projects as mainframes might, and many implementations will not pose budgetary and political problems comparable to what annoyed top management about indiscriminate end-user computing.

There thus seems reason to doubt that office systems as such will necessarily become the MIS executive's responsibility in the foreseeable future. On the other hand, OA functions embedded within computer systems may fall under MIS as components of a resource that MIS is charted to procure, develop or maintain.

MIS integrates the word processing of OA with DP and telecommunications, but a background in any of the three constituent technologies does not prepare anyone for the job of MIS executive, consultant Einar Stefferud said recently. DP managers typically lack insight into office problems across the organization, telecommunications managers seldom understand computing and WP managers are mostly ex-supervisors of typing pools, he declared.

Curriculum Developed

Nevertheless, 1981 marked an important year in the development of curricula for educating MIS professionals. The Data Processing Management Association (DPMA) issued the final draft of its recommended curriculum for undergraduate study in computer information systems (DPMA's name for MIS). Detailed in a *Computerworld In Depth* article [CW, Sept. 21], the curriculum model prescribes courses in OA, DSS, distributed data processing, information resource management and other topics quite peripheral to conventional computer science.

This summer, an informal *Computerworld* poll of DP/MIS managers turned up a consensus that academic programs in computing fail to adequately prepare people for work with commercial systems [CW, Aug. 17]. Most academic programs are in computer science, a theoretical and experimental science that is largely unconcerned with commercial applications.

The crux of the problem, therefore, is not poorly designed or poorly taught courses in commercial computing, it is simply the lack of such courses at U.S. colleges and universities, educators argue.

Thirty Pittsburgh, Pa., companies worked with 21 universities to devise their own model curriculum for education in business-oriented computing [CW, Oct. 5], released this year. Even the Association for Computing Machinery (ACM), a computer science society, has over the past few years published studies of where "information systems" is taught and how it should be taught to benefit society.

An ACM curriculum model and a National Science Foundation-sponsored study, "Computing and Higher Education: An Accidental Revolution," rounded out 1981 contributions to scholarly literature on the problem.

DPMA defined its prescribed course in DSS as "an analysis of the highest level of information support systems which serve the manager user. This system provides quantitative-based information derived from one or more data bases within and/or external to an organization and used to aid managers in the decision-making process. Theoretical concepts will be applied to real-world applications with an analysis of examples from specific organizations."

The U.S. may be ahead of Europe in computer science research and computing technology, but European universities seem better equipped than U.S. universities to teach what Americans call MIS, according to software engineering expert Peter Freeman, a computer science professor at the University of California in Irvine. In Europe, MIS and computer science roughly correspond to what is called "informatics," he noted.

Despite the profound divergence in the aims of computer science and the aims of DP or MIS, Freeman remarked that software engineering is bearing fruit at a time when computer science must address applications more to advance itself, and DP/MIS must address theory more to advance itself.

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Next Year's Budgets Hold No Surprises

Everything's Going Up!

By Marguerite Zientara
CW Staff

Salaries once again represent the biggest slice of the DP budget pie, with a whopping 42.3% average portion this year.

Forty DP managers from all areas of the country and from all sizes of installation responded to *Computerworld's* annual budget survey, which again found that "salaries and people" top the list of rising prices and are most often cited as the area of greatest concern.

Not only do salaries take up almost half the DP budget on the average, but the average projected 1982 increase in salaries is up to 17.1%, as compared with last year's figure of 13.1%. Last year, however, salaries made up an average 45.6% of the DP budget, slightly more than this year.

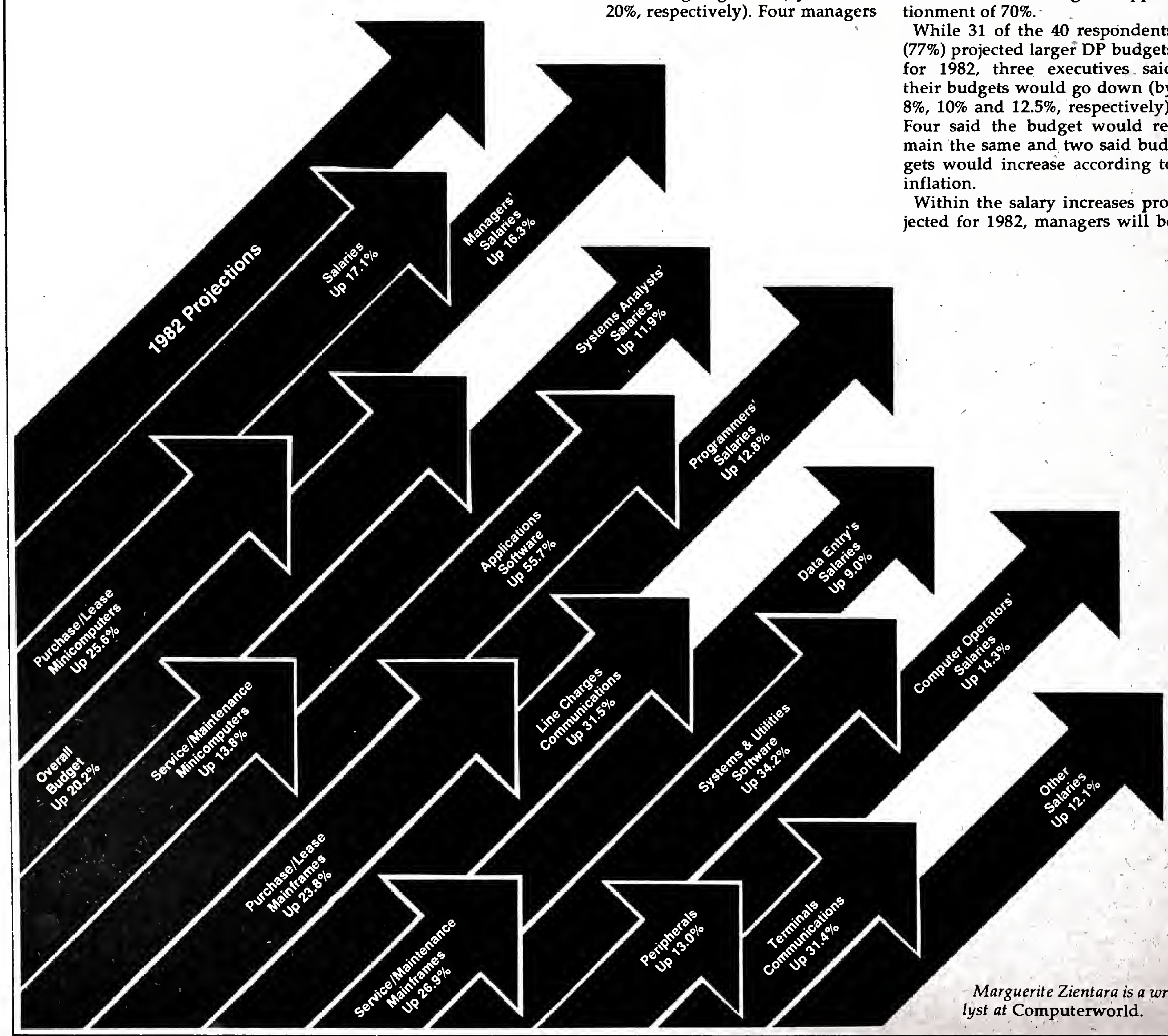
Of the 40 respondents, 32 said their budgeted salaries were going up, while only two indicated salaries were going down (by 15% and 20%, respectively). Four managers said salaries would remain at last year's level, and two said increases would be equal with inflation.

DP budgets overall are expected to increase an average of 20.3%, with individual increases ranging from 5% to 75%. That compares with CW's 1980 survey results of a 12% average overall increase.

The percentage of the DP budget dedicated to salaries ranged from 10% to 75%, as compared with last year's lowest salary apportionment of 25% and highest apportionment of 70%.

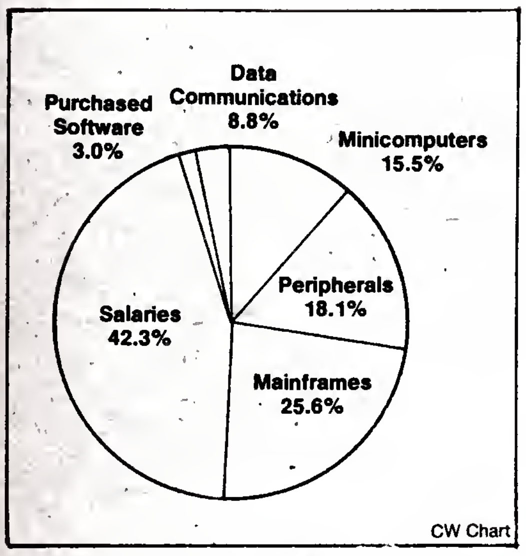
While 31 of the 40 respondents (77%) projected larger DP budgets for 1982, three executives said their budgets would go down (by 8%, 10% and 12.5%, respectively). Four said the budget would remain the same and two said budgets would increase according to inflation.

Within the salary increases projected for 1982, managers will be



Marguerite Zientara is a writer/analyst at Computerworld.

Everything's Going Up!



Average Percentages of DP Budget

getting the highest average increases, 16.3%, out of a range from 2% to 160%, according to 28 of the 40 respondents. Only one executive said managers' salaries would go down — by 15%.

Computer operators claim the next highest average increase in salary, with an average rise of 14.3%. Twenty-seven respondents claimed rises would be from 2% to 100%, with — again — one manager cutting those wages, by 10%.

Programmers came in third in the hierarchy of average wage increases, with an average increase of 12.8%, out of a 2% to 22.4% range, as indicated by 27 respondents. Two executives said their programmers' wages would drop — one by 5%, the other by 20%.

Systems analysts will experience an average 11.9% wage increase, according to the survey. Twenty-six managers indicated raises for that category, ranging from 2% to 50%. The same two managers who will cut programmers' wages will cut the incomes of systems analysts, by the same percentages.

Data entry personnel will experience the lowest increases on the average, at 9%, according to 22 respondents whose answers ranged from 2% to 25%. One manager will cut his data entry allotment by 20%.

In the "other" category of wages, the average increase, based on 13 replies, is 12.1%, with a range from 2% to 50%.

New Hires

Among the 20 managers who said they plan to add new personnel next year, programmers and system developers were most often mentioned as the categories that would be supplemented. Nineteen managers do not plan to add personnel and one "may."

Exactly half the managers surveyed said they had problems finding skilled DP personnel, with the other half experiencing no such problems. Thirteen of those indicating they had no problems finding personnel also indicated their turnover rate had remained the same in the last two years. Twelve managers who are having problems finding skilled workers said their turnover rates have been the same over the past two years.

Of those with problems finding personnel, four said their turnover rates had gone down and four said their rates had gone up. Of those indicating they had no problem finding skilled workers, six said turnover had gone down and one said it had risen.

Problems or not, 33 of the 40 respondents said they had filled all of their new hire positions last year, while only five were not able to staff all of their openings.

Of those able to fill their personnel openings, the most often cited method of recruitment (by 20 managers) was newspaper advertisements, followed by agencies (8), referrals (7), "headhunters" (5), personal contacts (3), job service commissions (3), "leads at the university" (2) and in-house personnel departments (2).

Asked whether they have any plans to offer cash or stock options as hiring incentives in the future, an overwhelming majority of 37 managers said no, while only three said yes. More balanced were the responses to whether managers had hired personnel from non-DP backgrounds: 19 yes, 21 no.

Fourteen who had hired from non-DP backgrounds felt those workers were effective, and one indicated they included "some of our best." No manager said such workers were not effective, but some qualified their responses with such comments as:

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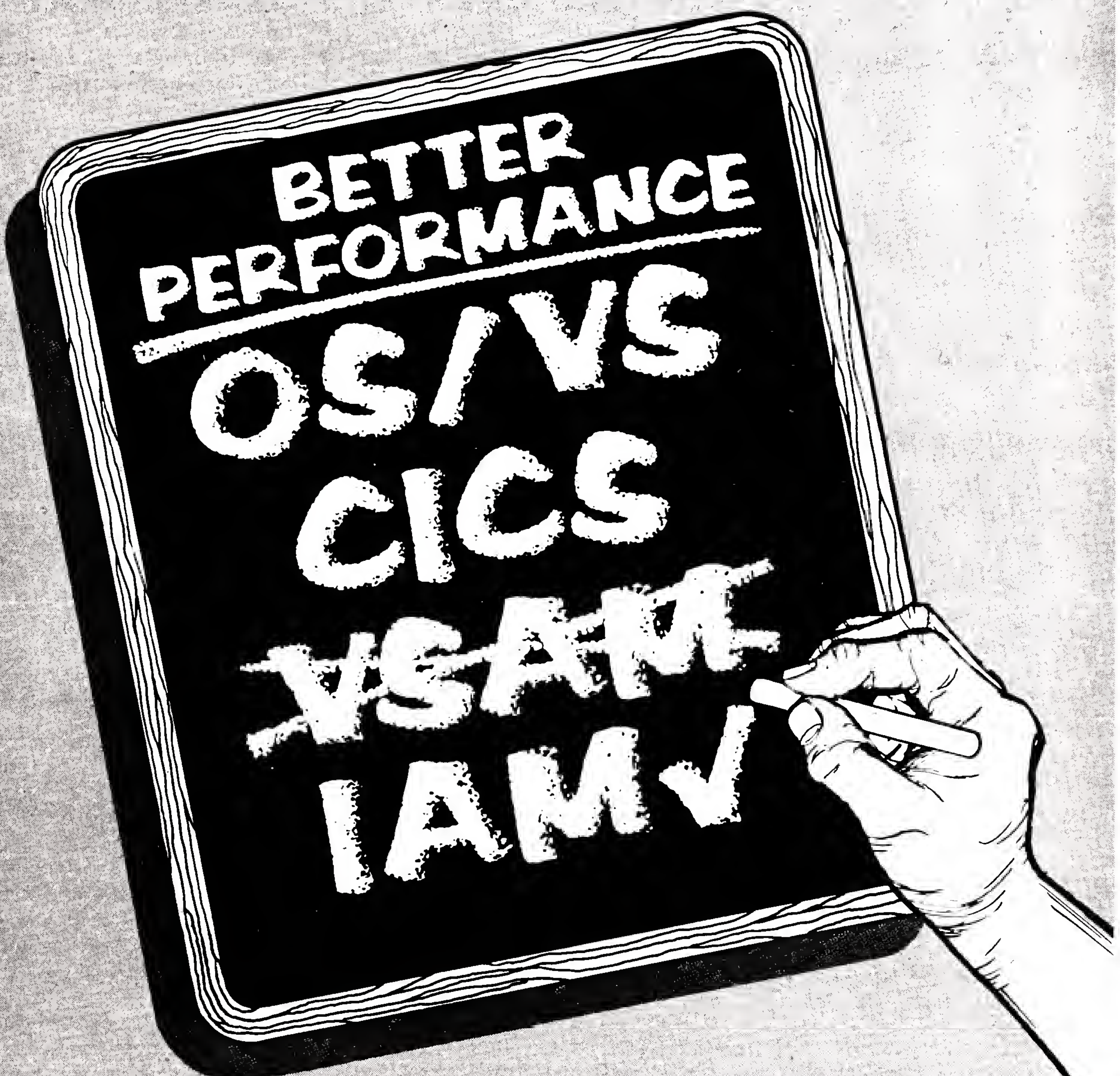

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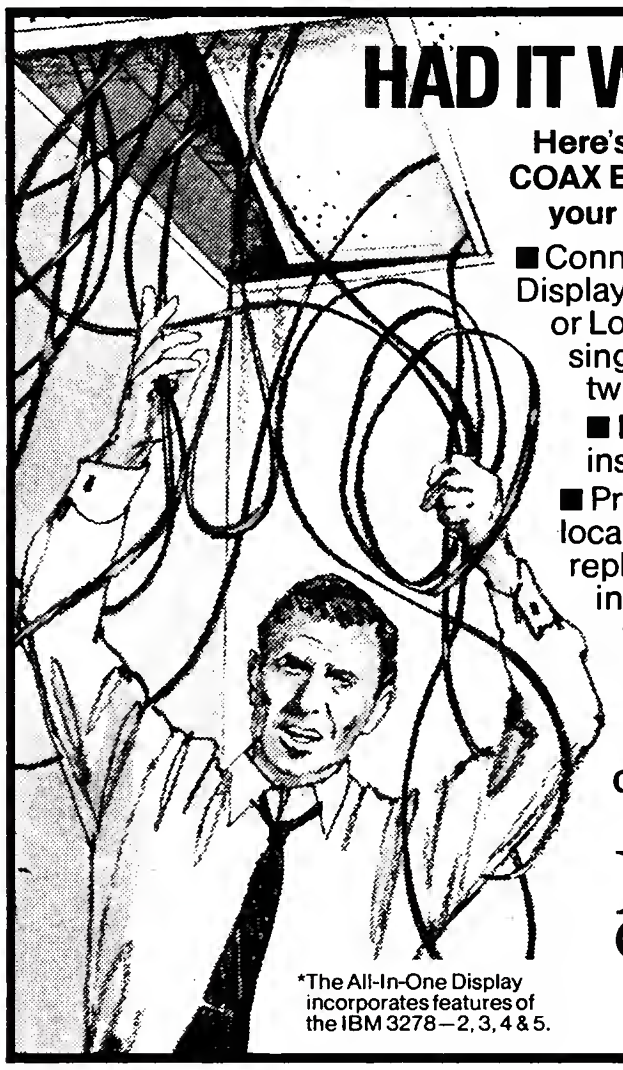

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"most are," "with training" and "50% effective."

The non-DPers hired are most often recent college graduates (cited by five managers), from an accounting/clerical background (also five) or from a marketing background (four).

Mentioned once each were: high school graduates, vocational school graduates, those from a business background, those with an interest in DP, Control Data Institute graduates, those with one year of college DP and those with experience in topographical work and biology.

Once a worker is hired, it appears not much time or money is dedicated to his training, on the average. Of 36 respondents, the average percentage of the DP budget spent on education and training was 2.6%, from a range of "one-one-hundredths percent" to 10%.

On-the-Job Duties

As for exactly what programmers do all day, percentages of time spent on new systems development vs. software maintenance were all over the block. The average amount of time spent on software maintenance was 46.8%, an average gleaned from 36 responses. Answers ranged from 5% to 95%.

An average of 51% of programmers' time was spent on new systems development, according to the answers of the same 36 managers. Those replies ranged from 5% to 90%.

Asked in what areas prices have risen most in the past year, the largest percentage of managers (20 out of 40) cited salaries, followed by supplies (12), maintenance (five), software (four), contract programming (two), equipment leasing (one) and phone communications lines (one).

Predictably, the largest percentage of managers also cited salaries, turnover and recruitment as the area of their greatest concern in 1982 (eight out of 40). With many respondents listing more than one concern, the breakdown is as follows: software (seven), conversion (five), accomplishing needed projects (three), keeping up with company growth (three), keeping abreast of current techniques (two), having old equipment (two), keeping costs down (two) and increasing efficiency (two).

Concerns Voiced

The following concerns were voiced by one manager each: equipment selection, user education, maintaining client base, distributed DP network, standardizing internal DP system, supplies, lease costs and integrating office automation.

The DP manager of a Boston-based health care facility registered strong feelings about top management's lack of understanding of "the human factor." "We have a know-nothing management when it comes to DP," he said.

Only nine of the managers surveyed said the recession had affected DP spending, while the remaining 31 said it had no effect.

IBM proved to be the predominant supplier among the survey respondents, with 32 out of 40 (80%) using IBM equipment. Respondents represented a broad range of industries, including manufacturing, retail, health care, public utilities, insurance, publishing and education. Their DP budgets ranged in size from $50,000 to $15 million.

Who Guards the OA Budget?

Twenty-six managers surveyed by *Computerworld* indicated that they play a role in selecting office automation (OA) equipment, while 13 indicated they do not. At one installation, the role is still "undefined." Twelve DP executives said OA equipment is included in the DP budget, while the remaining 18 said OA is separate.

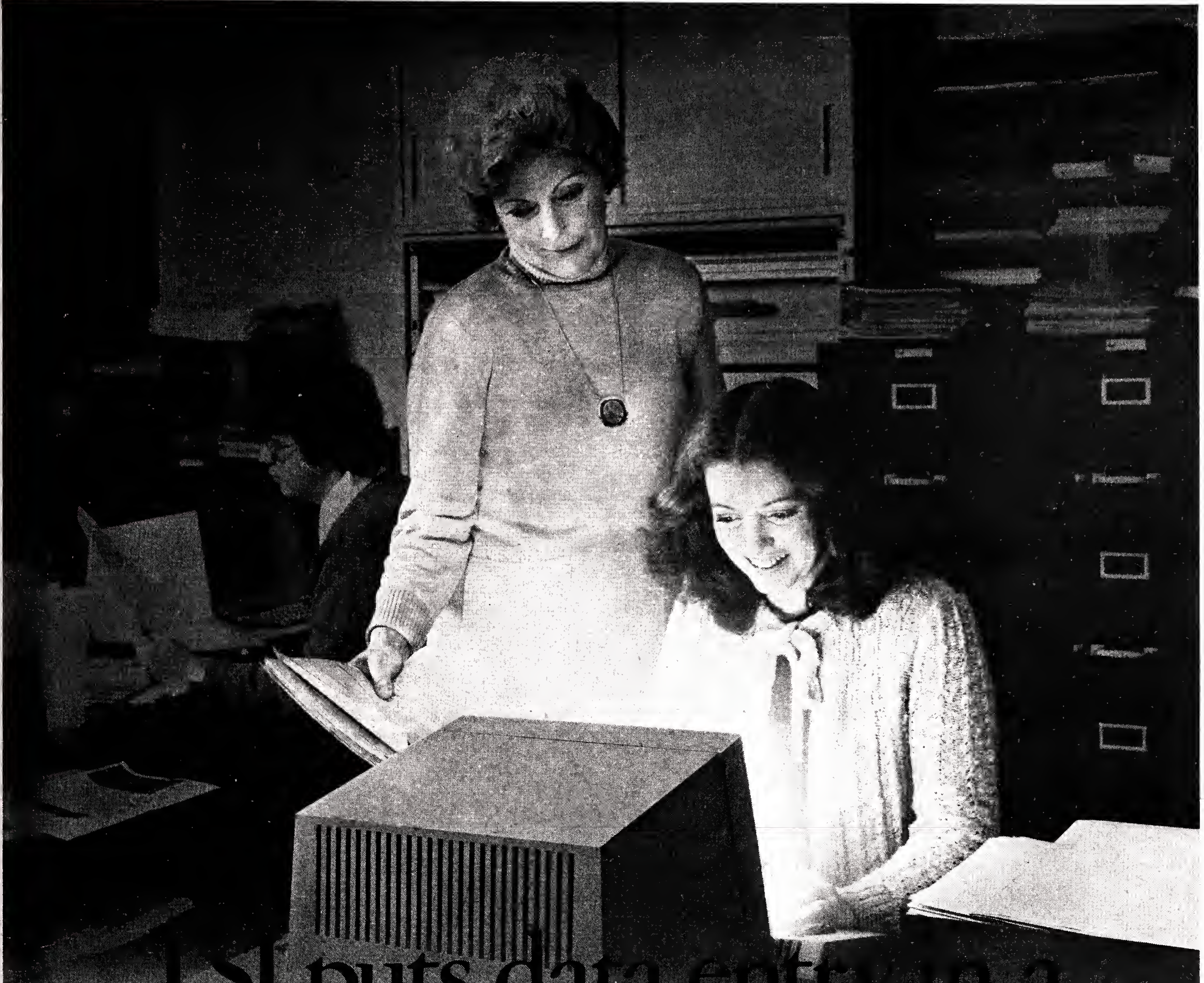
Of those who said their OA budgets were separate from DP, only five knew the dollar size of those budgets. In a firm with a $150,000 DP budget, OA got a $10,000 allotment (gross revenues of the firm were not available). A $200,000 DP budget was juxtaposed with a $65,000 OA budget (again, revenues were not available).

A $750,000 DP budget sits beside a $40,000 OA budget (revenues not available), and a $400 million firm has a $2.5 million DP budget and a $1 million OA budget. Finally, a $500 million concern supports a $7.6 million DP and a $750,000 OA budget.

Of those managers with OA equipment now, IBM again heads the list of vendors, with five executives having either 5520 desktop computers or Displaywriters. Wang Laboratories, Inc. and Four-Phase, Inc. are second with two installations each. Other word processors mentioned were Xerox Corp., CPT Corp., NCR Corp., Datapoint Corp., Diablo Systems, Inc. and Quix.

Of the 40 survey respondents, 14 plan to acquire OA equipment in 1982, 11 do not and two may. As for what managers will be buying for OA next year, seven plan to get something but do not yet know what it will be.

The DP manager of a CPA firm in New York expects to get an additional $1 million worth of what he already has — Wang's multistation word processor. Four managers plan to increase their supplies of IBM 5520s or Displaywriters, and one will get either "Xerox, Wang or IBM."



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Everything's Going Up!

Users See Software Application Costs Up in '82

The area of greatest increased cost in 1982 DP budgets will be software applications, according to the *Computerworld* survey, although purchased software is typically only 3% of the DP budget.

The average increase will be 55.7%, as compared with last year's 16.4% increase. Only nine managers indicated a rise in software applications costs, with answers ranging from 10% to 100%, resulting in the high average. Sixteen managers said those costs would remain even, while two said they would go up, without specifying a percentage.

Systems and Utilities

Systems and utilities packages will experience the next greatest percentage of increase, according to the survey, at 34.2%, as compared with last year's 18%. The 17 replies ranged from 1% to 200%-300%. Sixteen managers said systems and utilities packages would remain even, while two indicated costs would go up.

With only four replies to the question of price rises for "data base management systems and related facilities," the average rise was 43.7%, from a 20% to 100% range. Fifteen executives said costs would stay the same, three said they would go up and one said they would go down.

An average of 8.8% of the DP budget is spent on data communications, up from 4.5% last year, according to 37 respondents, whose answers ranged from 0% to 100%. Increases for the costs of communications lines and terminals are almost even — lines at 31.5% and terminals at 31.4%.

In comparison, communications line expenses last year were projected to rise only 28.4%, while terminal costs were expected to increase by an average of 37.6%. "Other" data communications equipment is expected to rise in outlay by an average 12.8% according to six replies ranging from 1% to 33%.

Local networks apparently are not the hottest item around. Of the 40 managers surveyed, not one said he would be installing a local network in 1982.

Mainframe Budgets

Of the 26 respondents who have mainframes, the average percentage of the budget spent on their purchase/lease and service/maintenance is 25.6%. Purchase/lease costs are expected to rise an average of 23.8%, while service/maintenance expenses will probably go up by 26.9%, according to the survey. Of the 15 managers faced with increasing costs in the mainframe area in 1982, nine indicated they would be acquiring new equipment next year. Some managers, who currently have no mainframe, will also be acquiring new equipment.

IBM tops the list of equipment to be acquired, with four managers looking forward to a System/38, three desiring a 3033, two each anticipating a 4341 and System/34 and one each awaiting a 3081 and 4331.

Other new equipment included disks; three minicomputers including Prime Inc.'s Model 750, Four-Phase's 4/95 and two General Automation 220s; and added communications devices to a Honeywell Level 64. Peripherals now claim 18.1% of the average DP budget, while last year the figure was only 8.8%. The range in 25 responses was 0% to 72%. The average increase in spending for peripherals will be 13%, according to the survey, a figure close to last year's 12.2%.

The largest jump by far in budget apportionments is in the area of minicomputers, where the figure has risen from a 2.2% average budget portion last year to 15.5% this year. Purchase/lease costs are expected to rise 25.6%, the same figure as last year's total expected rise for minicomputer costs. In addition, service/maintenance costs are expected to rise by an average 13.8%.

Do minis come out of the DP budget or are they purchased by user departments? Nineteen managers said "DP," 13 said "user," and three said "both."

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Opening the Door to the Information Center

The First Step

By Lois Paul
CW Staff

DP managers desperately searching for solutions to the ever-mounting applications backlog are encountering a new buzzword — the information center — which appears to provide at least a partial solution to the problem.

Everyone in DP seems to want an information center, but few people are completely clear on what the concept involves or where it came from. Perhaps not surprisingly, the concept was developed by IBM about one-and-a-half years ago, after being used in-house by the firm's Canadian installations.

IBM defined the information center as an organization which, under the control and coordination of the DP department, is designed specifically to support, assist and educate end users to make direct use of application software tools to develop and do maintenance and do their own applications (see Figures 1, 2 and 3).

George B. Richardson, manager of IBM's Washington application development marketing center, said that, approximately half of the time, users are capable of completing the applications they request the DP department to handle. "This [the information center] is not a quick code shop or a shop that does application coding for end users. Where that does occur, you're simply moving the bottleneck. What we are talking about here is truly end users utilizing the end-user-friendly products to do their own applications." (See Figure 4.)

The information center is intended to help users handle applications such as one-time reports or, in existing reports, minor changes that do not require the involvement of "the very scarce DP professional."

There is no standard type of information center from a hardware standpoint, according to Richardson. The concept is used all the way from the IBM 4331 environment up to the 3081. "The thing there is you just get enough horsepower to drive the end users, given the response level that you want." The concept is not unique to any industry or any size of installation. Any company interested in improving the productivity of its white-collar workers could use an information center, he said.

There are some rules-of-thumb when it comes to staffing. Richardson said the best ratio is probably one information center staff person for every 50 end users that will be served.

In addition to the overall information center manager, there are generally two kinds of people staffing the center: consultants and product specialists, Richardson explained. It is the consultant's job to familiarize users with the center itself and to help them determine what software product will help them do their jobs better. They are then directed by the consultant to the product specialist for additional education and support.

Software tools generally offered by the information center staff are for query, analysis, report writing and text handling, according to Richardson.

Information center specialists should be good communicators who have the technical knowledge to help end users define their needs and determine how they can fulfill them. Richardson said these people often come from application development areas. Another source is end users themselves who become proficient in the use of certain software tools and make the career shift to support other users.

Generally, the development of an information center within a company is initiated by DP rather than by upper management. An important question, therefore, is how the DP operation will be affected. Richardson indicated that companies using an information center can sometimes reduce their

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Lois Paul is senior editor of software at Computerworld.

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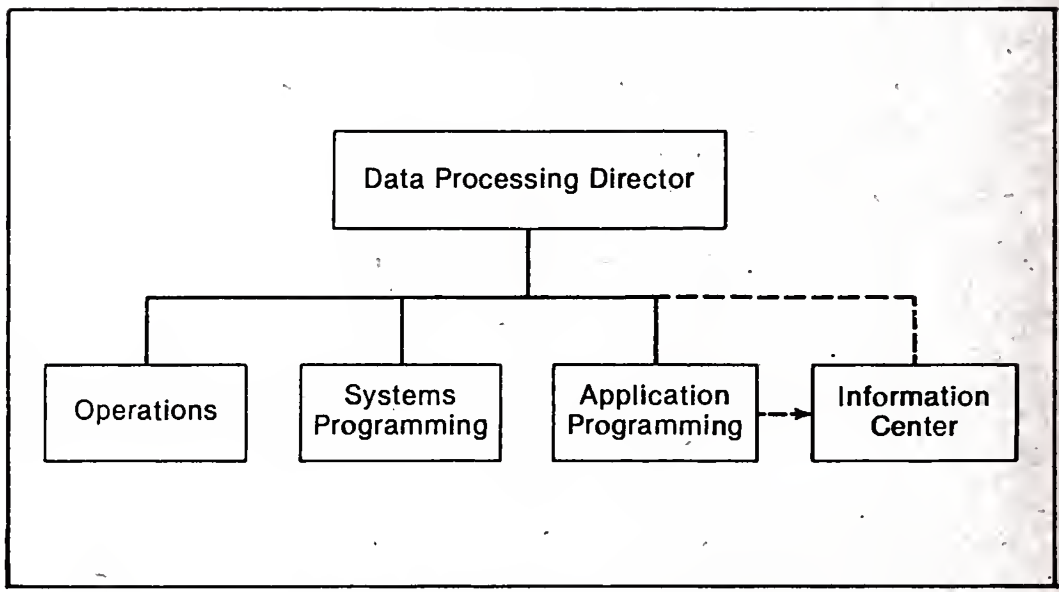


Source: IBM

Organizing to Support the End User

program maintenance load from 70% of the programmers' time to less than 50% and, in some cases, close to 40%.

The most popular method for companies to gauge the potential effect of an information center is to set one up on a pilot basis, supporting perhaps one end-user department for a period of time, and then to measure the results. IBM offers a group of people — an application transfer team — to study the feasibility of developing an information center within an organization.

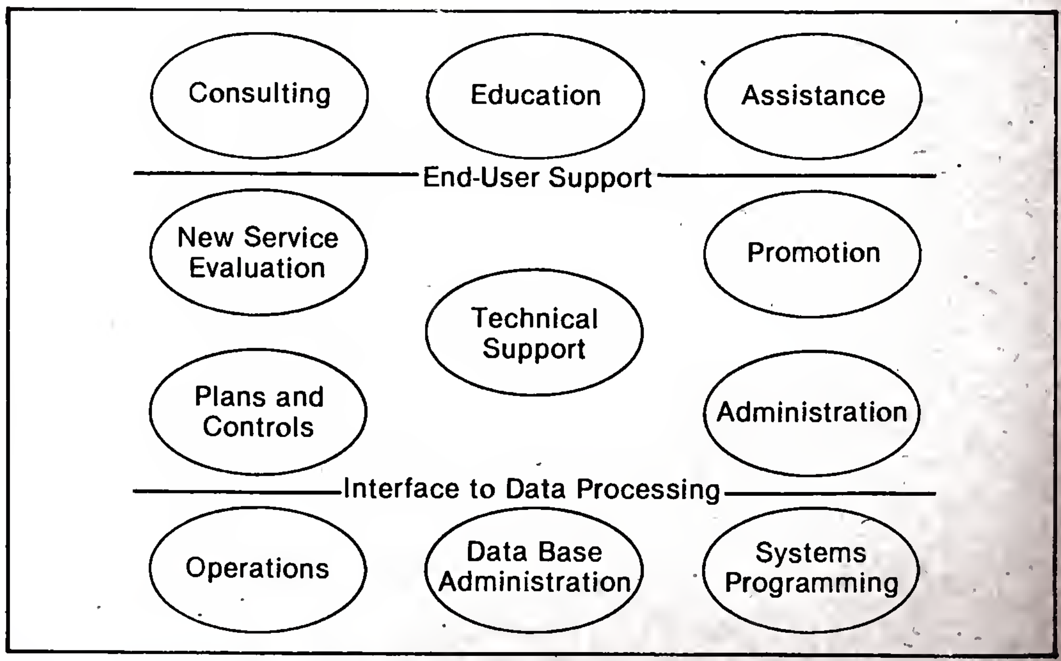
"We have a computerized model," Richardson said. "We can go out and, through a series of questionnaires and surveys, get that information. We tender the model to fit the acceptable cost criteria of the individual customer. Then we go through an actual modeling process and we can pretty well forecast what that is going to be."

Dr. Dixon Doll, president of the DMW Group, said it is important that the DP department retain centralized control of the information center. "Proper levels of responsibility are defined and the data base administration function specification of an appropriate supporting organizational unit is a very key idea behind the successful implementation of the information center concept."

Doll said he does not see any tremendous technological problems with the information center, although the normal problems that accompany any new concept can be expected. He noted that one possible "negative" is that the specialized languages used through the information center are limited to narrow applications. Another possible problem is resistance among end users to the effort of learning to use the tools.

Ronald G. Ross, a senior staff consultant for Performance Development Corp., echoed Doll's reservations, although he said he felt the information center is a valid and positive concept, particularly for companies trying to retain control over the use of computing and the use of information. He cautioned, however, that "unless there is some kind of facilitation, coordination and control over the transfer of data, what you will end up with is a lot of redundancy, a lot of inaccurate data, a lot of operational problems and just basically a lot of duplication of effort."

DP managers' inertia and fear of losing their influence may be potential roadblocks to the development of these centers, according to Ross. "Consequently, you will have a lot of people buying their own computers, their own private machines and going to service bureaus and having their own so-called data base machines. What that represents is a wholesale fragmentation of computing in the company and, ultimately, a serious problem."



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The First Step

Fledgling Information Center Users Take Flight

By Lois Paul
CW Staff

Most of the current users of information centers admit they are at the "infant stage" of the concept's development.

They typically are starting slowly, assigning only one or two people to the center and are essentially keeping the end users at bay until they are fully geared up to handle requests.

Most of those contacted by *Computerworld* said they developed the idea after contact with IBM, generally through Guide user group meetings. All are IBM or plug-compatible mainframe users. The majority will distribute newsletters to alert users to the center's capability and to schedule educational sessions. End-user departments are typically being charged for computer resources only — not for the services of the information center specialists.

One of the "oldest" information centers is the one Union Carbide Corp. developed nine months ago at its South Charleston, W. Va., location that serves about 1,200 users across the states.

The basic services, according to John Kincaid, systems analyst with the CMS operating system support group, are "quick and dirty" consulting, education and referrals. A major portion of the consulting work is done via a time-sharing hotline.

"The information center staff must not become involved in applications program development," Kincaid noted. These tasks are passed on to an applications group. His group will recommend Infodata Systems, Inc.'s Inquire, SAS Institute, Inc.'s SAS or Integrated Software Systems Corp.'s Tell-A-Graf packages to users to fill defined needs.

Strive to Overcommunicate

A key to success for an information center, according to Kincaid, is to strive to overcommunicate. Staffing is another major consideration. It must involve the "right people" who are skilled technically, self-motivated, service-oriented, able to communicate with end users, good teachers and practical. "If you find someone who meets these qualifications, they should be cloned."

The information center was developed as the result of a two-year study, Kincaid explained. His DP department is in direct competition with other in-house data centers. "People are coming to our facility, and I think it is more because of the support that we offer, rather than the hardware and the software, because we have duplicate hardware and software in other data centers."

The information center idea at Diamond Shamrock Corp. in Akron, Ohio, originated with a manager of applications development who had contact with IBM's Canadian installations. Jay Murray, supervisor of the

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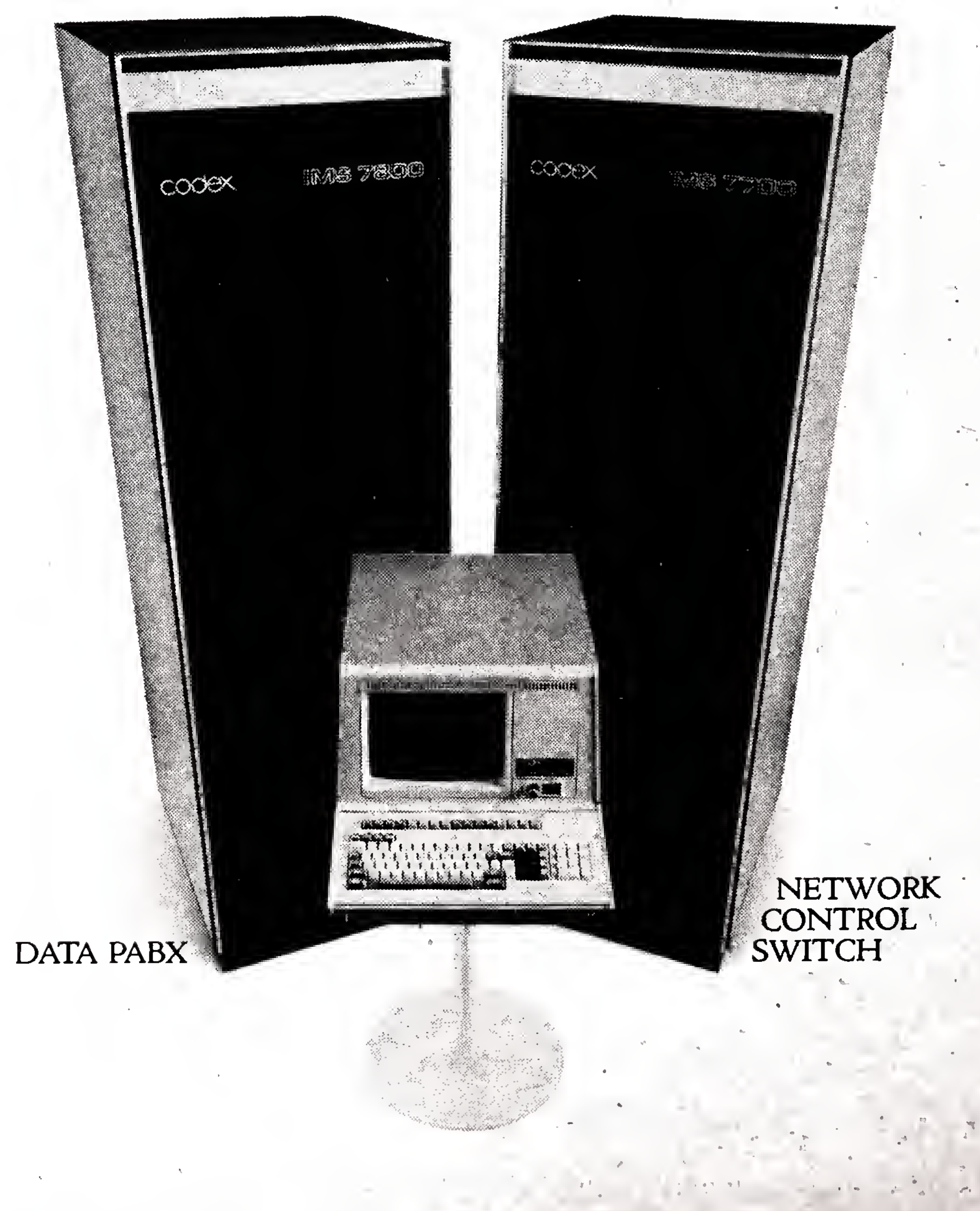

new center there, said a study was done in the spring of 1981 and he was appointed on Aug. 1.

The product currently being offered by the information center is Informatics, Inc.'s Inquiry IV/IMS.

Murray's center is working closely with a "sort of information center" that the company is operating out of its Amarillo, Texas, location. That site is employing IBM's A Departmental Reporting System (ADRS) and Query by Example software packages.

Plans for the new information center include using an Amdahl Corp. 480 V/7 as "a full-blown information center machine" based in Houston that will support the IBM software being used by both the Akron and Amarillo information centers.

California State Automobile Association used the pilot approach to develop its information center, systems analyst Karen White explained. The two part-time center staffers took a pilot group of end users to IBM's applications productivity facility in San Francisco to be trained with them in the use of ADRS.

White supports IBM's ADRS. The other woman — a former teacher and documentation specialist — supports IBM's Script/370, a text processor. They recently recommended that Information Builders, Inc.'s Focus package be added to the information center.

White noted that one of the things she learned at Guide was that former teachers and librarians make excellent information center specialists. As of Jan. 1, one more staff worker — a systems analyst — will be added to the staff and White will be devoting full-time efforts to the center.

There is no system dedicated specifically to the information center, White said, and resource utilization is being monitored by having the people who work with information center products do so on a particular set of user IDs.

Training consists of one-on-one assistance, formal classes and providing access to IBM's independent study tools. A newsletter will be issued only to people they currently are supporting. "We just don't dare announce our presence to everyone because we can't handle it," she said.

Gould System

Gould Pumps, Inc. developed its information center as the result of an internal survey and study of DP resources that yielded an unfavorable report in March 1980.

"We really overall had a bad name," Carl Smith, the new information center manager, said. The company's 50-person DP shop spent most of its time "putting out fires." The center was established in September 1980 as one of 12 plans to rectify DP problems. Its basic product is Pansophic Systems, Inc.'s Easytrieve, and it currently serves between 60 and 75 users.

The Gould information center will be incorporating On-Line Systems, Inc.'s Foresight package and will run this under IBM's TSO. The next step is to add a person strong in the financial area, possibly a junior accountant. "With user-friendly products, it is not important that they are DP people," Smith explained.

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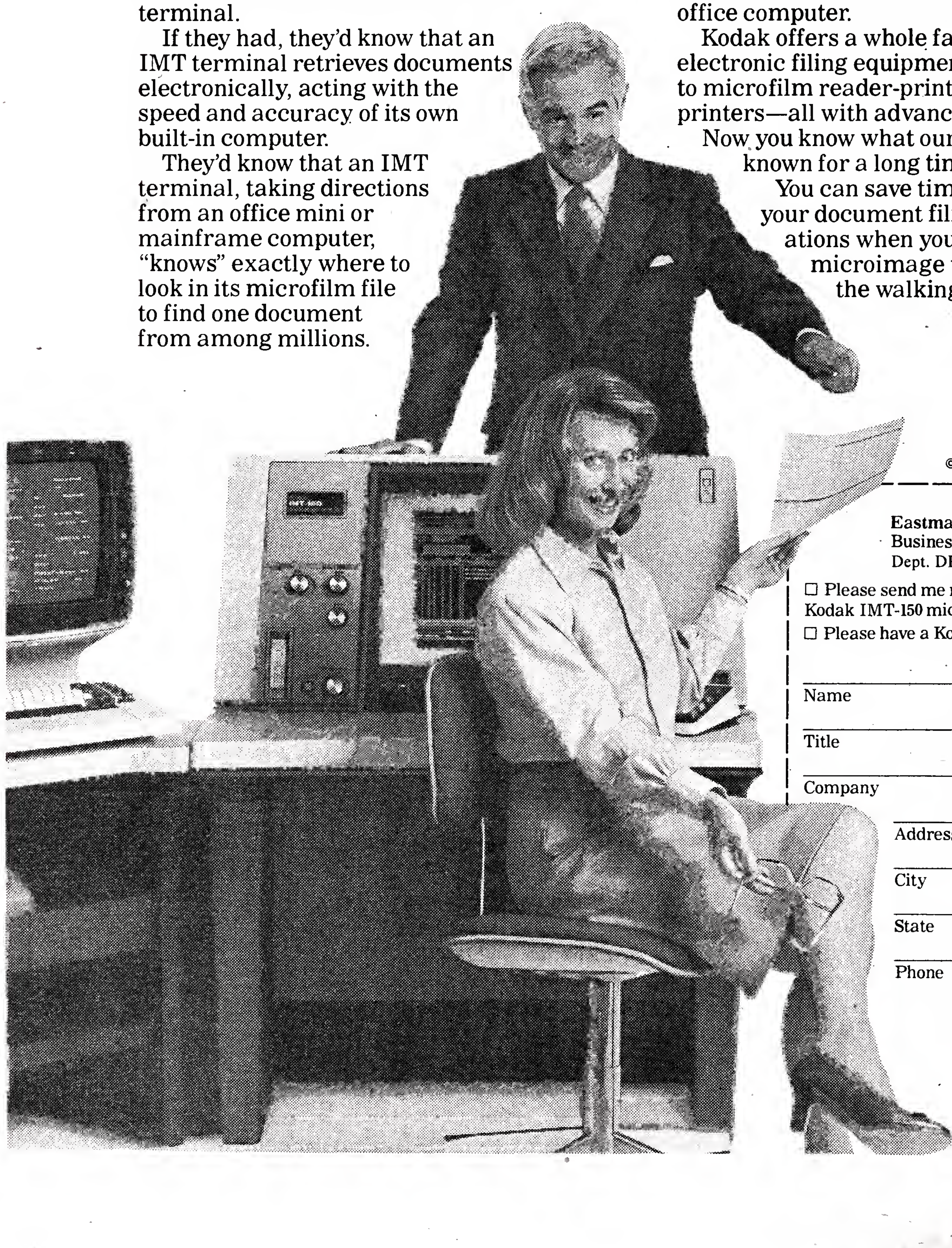

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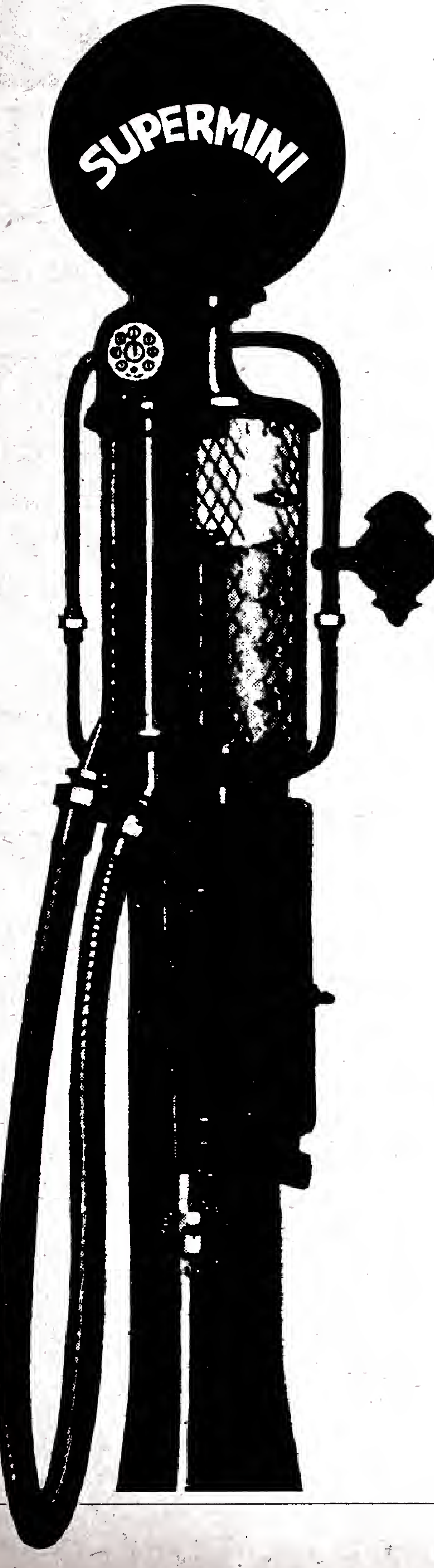
More Power at the Pump



By Tom Henkel
CW Staff

Small may be beautiful in some areas, but "bigger is better" was the watchword for computers over the past year.

Over the course of 1981, 32-bit superminis came out in a flurry of announcements. And the trend seems to be that processors formerly aimed at the computer hobbyist are taking on the capabilities of small business systems or minicomputers. Minis, in turn, are beginning to look more like mainframes.

At the low end, IBM entered the personal computer market with the introduction of a 16-bit processor for home use that can also be used as a workstation attached to a larger host. Until now, most personal computers employed 8-bit processors, but the tide may be changing.

Digital Equipment Corp., which recently announced 8-bit add-in boards to its VT-100 terminals in order to provide intelligent workstation capabilities, may follow IBM's lead and announce a 16-bit processor for the terminals, according to Ken Olsen, company president and chief executive officer. While Olsen did not officially announce the 16-bit processor, he strongly suggested that it would come along, as have other high-placed DEC officials.

But the supermini marketplace is where real changes are taking place. Nearly every large-scale minicomputer vendor announced a 32-bit processor during 1981. Prime Computer Corp. introduced its top-of-the-line Model 850; Data General Corp. expanded its MV line with the MV 6000; and smaller vendors including Formation, Inc., Stratus Computer, Inc. and Charles River Data Systems, Inc. also announced 32-bit superminis.

Apparently, each level of computing is taking a step upward. Hobbyists and very small business users want to run larger programs. The traditional small businessman wants to run larger programs as well as look for user-friendly systems that provide more extensive data base management capabilities.

One answer to those needs means making more bits available to these users. The amount of information a processor can address — its bit size — determines two key factors. First, it regulates the size of the programs that can be executed on the system. Secondly, it determines, to some degree, how quickly the code can be processed.

Most processors fall into one of three architectural classes — 8-, 16- or 32 bits. However, IBM's System/38 uses a 48-bit architecture, and others, like IBM's 370 line, employ a 32-bit architecture while actively utilizing only 24 bits. Scientifically oriented processors like those in the Harris Corp.'s family employ a 24-bit architecture. However, most commercial minicomputers are 16-bit systems, according to industry experts.

In the past, the distinctions between processor classes was relatively clear. DEC's PDP-11 and DG's M/600 were defined as minicomputers. Mainframes included the IBM 370 family, Control Data Corp.'s Cyber 170 and Sperry Univac's 1100 series. With the surge of 32-bit minis, that distinction begins to blur.

Top-of-the-line mainframes are still in a class by themselves. IBM's 3081D, for example, can execute about 10 million instructions per second (Mips) and offers up to 32M bytes of main memory. Superminis, by contrast, tend to cruise along at the 1 Mips level and usually offer a top main memory capacity of 8M bytes.

The blurring takes place at the low end of the mainframe scale. DEC's Decsystem-20, which the vendor refers to as a mainframe, runs at about 1.3 Mips and offers 8M bytes of main memory. Prime's Series 50 Model 850, generally dubbed a supermini, runs at about 1.6 Mips and also offers 8M bytes of main memory, according to that vendor.

Industry analysts agree that the choice between buying a mainframe or a supermini is a personal one. These analysts also contend that the applications offered by the vendors are often more important than the hardware. A system that employs software that closely matches a firm's needs may be more beneficial than a more powerful system with less sympathetic software.

In some ways, superminis based on new technology are filling niches left by older mainframes that are being voluntarily phased out by vendors. A variety of minis and superminis, for example, are currently compared to the upper end of IBM's 370 line. While the 370 is still popular in the field, IBM has long since removed those processors from its new production list, replacing them with the 4300 line and its low-end 3033 models.

There are, however, some obvious differences between mainframes and minis, and none of them make the selection process easier.

Tom Henkel is a senior staff writer for hardware at Computerworld.

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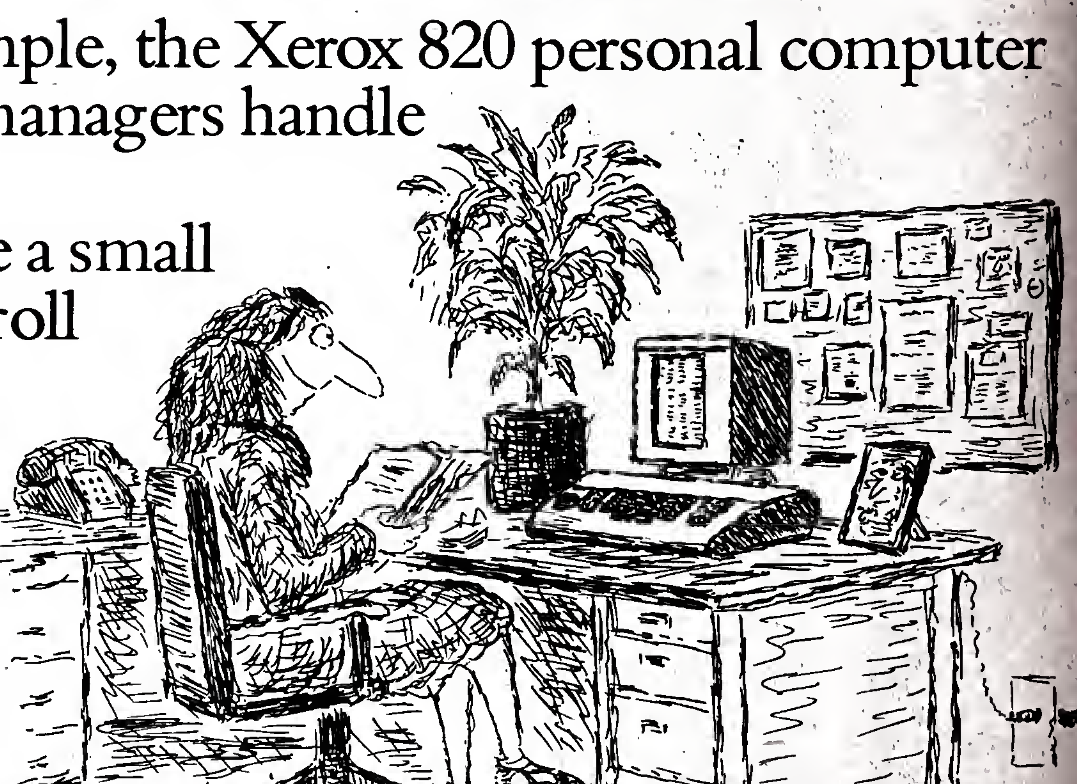

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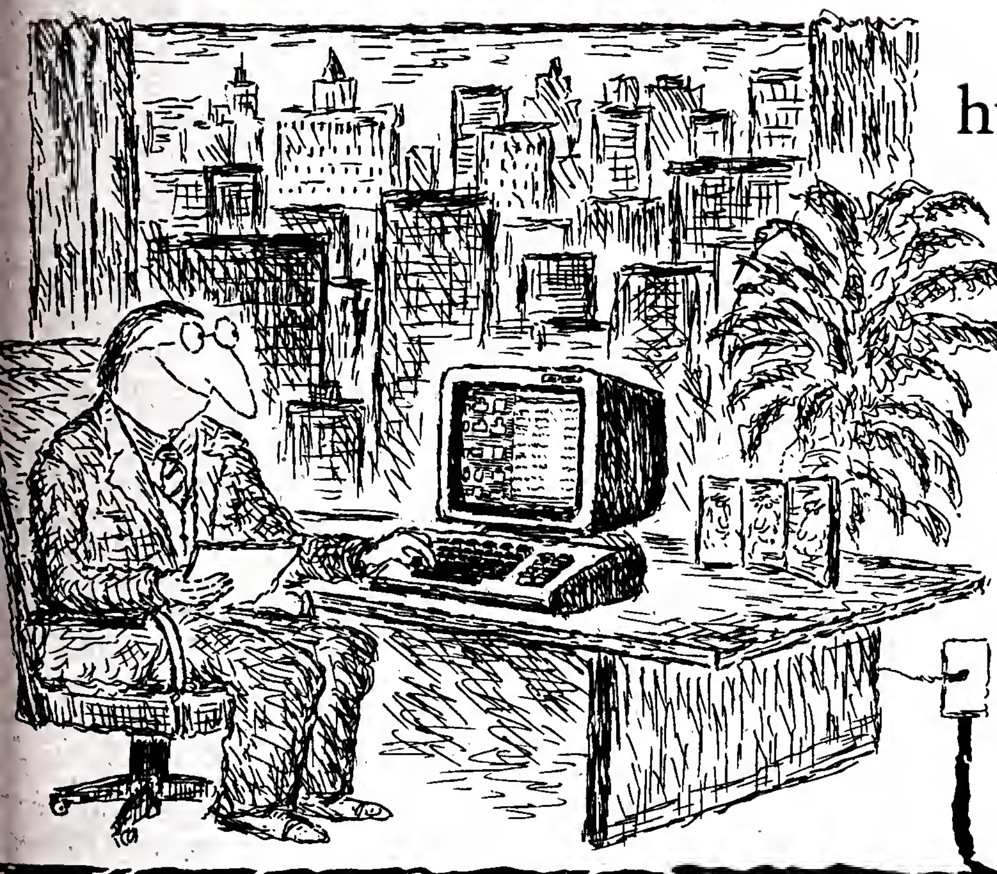

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More Power at the Pump

Price is one such distinction. Some industry observers have specified the $200,000 mark as the dividing line between a mainframe and a mini. The problem with that distinction is that the processors can be used in different ways. IBM's 4341 line, for example, costs more than $200,000. But when the 4341 runs under the VM or newly announced Small Systems Executive operating systems, it performs much like a minicomputer. Under DOS/VSE or MVS/SP operating systems the processor operates like a mainframe.

Marketing strategy is another distinction. Mainframe vendors usually offer purchase, rent and leasing arrangements; minicomputer vendors tend to limit their offerings to a purchase basis. Some mini vendors offer a lease pay-back arrangement, but none offers an agreement where the user pays for a system for a while with the option of returning it when a predetermined period of time has expired. Marketing distinctions become less clear with some large vendors, which offer lease deals on a variety of processors, including minicomputers.

The hardware cooling method is one more indicator. Most minicomputers are air-cooled while mainframes, as a rule, are liquid-cooled. That distinction is historical and according to some, still practical.

In the early days of DP, computers were much larger and gave off significantly more heat than today's large-scale integration circuitry versions. Liquid cooling was more effective for these older machines. However, firms like Amdahl Corp. have designed air-cooled mainframes that rival the performance of some water-cooled processors.

Some analysts contend that computers in the 50-Mips range and up will require liquid cooling. So far, Amdahl has kept pace with IBM's 3081 line via its 24-Mips 580-5880 processor.

The disadvantage of liquid cooling is twofold. It requires special plumbing into the computer room, which is an added expense for users converting to a liquid-cooled system. Yankee Group analyst Gerard Hallaren noted that processors must be in the $1 million and over range to warrant the $250,000 to $300,000 plumbing bill to install liquid cooling.

And liquid cooling makes it more difficult to move the processor. If a firm decides to move its DP facility or to expand the existing facility, some replumbing may be necessary. In addition, a raised floor and power lines may have to be moved.

Power is another distinction between mainframes and minis. Mainframes tend to operate with three-phase power, while minicomputers can generally use standard power. That makes minicomputers cheaper to run and easier to move, according to Hallaren.

In terms of functionality, minicomputers and low-end mainframes do about the same thing. They generally support the same basic types of applications, data base management packages and compilers. But the extent of that support usually depends on the user's financial commitment, Hallaren noted.

One advantage of a mainframe is that it can sometimes be field upgraded to become a much larger processor. Honeywell, Inc.'s entry-level DPS 8/20, for example, costs slightly less than $200,000 for a .38-Mips processor. That unit can be field-upgraded to an 8.2-Mips DPS 8/70 Level 7 processor costing more than $1 million.

Mainframes also tend to offer more sophisticated operating systems than minis. That can be an advantage or disadvantage. The sophisticated software allows users to accomplish more complex tasks, but more highly paid personnel are usually necessary in order to implement those systems.

Since superminis are less expensive than mainframes, the operating costs become lower in distributed environments. And the superminis can accomplish most of the same functions as the larger mainframes in a distributed mode, Hallaren said.

The bottom line is that there are two basic philosophies available to users in the medium to large-scale processing marketplace. The best approach is to make a judgment call based on the user's budget, staff, applications and distribution needs.

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Will the U.S. Confront Its Systems' Flaws?

Vulnerability

By Jake Kirchner
CW Washington Bureau

On June 3, 1980, a summer day unremarkable in most respects, a government computer in Colorado generated a startling message: The world was about to end.

With cold imprecision, the North American Air Defense Command (Norad) system signaled that a wave of Russian missiles was bringing nuclear holocaust to the North American continent. But, as a retaliatory strike force warmed up on Strategic Air Command (SAC) runways around the country, the human element of the early warning system took over and recognized the situation for what it was — a false alert.

As news of the incident filtered to the press, the Defense Department worked hurriedly to pinpoint the cause of the potentially disastrous computer error. Norad technicians resorted to the tried and true method of leaving the offending machinery on-line, hoping for a repeat of the malfunction.

The faulty component, an integrated circuit in a communications multiplexer, was eventually detected and replaced, but only after another failure that once again scrambled SAC bomber crews. The Soviet Union publicly displayed considerable nervousness about the incidents; but there was no less concern on Capitol Hill, where both houses of Congress initiated investigations into the reliability of the Norad DP/telecommunications system.

Besides fearing another glitch might cause the final World War, official Washington also worried that the errant system could not be trusted to warn of a real attack, thus constituting an unacceptable national vulnerability.

Tremors in Europe

But if the incidents made for some uneasy moments in Washington and Moscow, they did not go unnoticed in the capitals of America's European allies either. In the British Parliament, for example, the events precipitated a round of grave rhetoric on doomsday devices and spine-chilling scenarios of nuclear horror.

The June events were no doubt also closely watched in Sweden, where a three-year-old government committee on vulnerability had already concluded that computerization has led to an unacceptably high degree of risk to modern societies. The Swedish committee's final report — a seminal work on the subject of vulnerability — noted that in times of national emergency, reliance on foreign hardware and software and communications services could be disastrous economically as well as militarily.

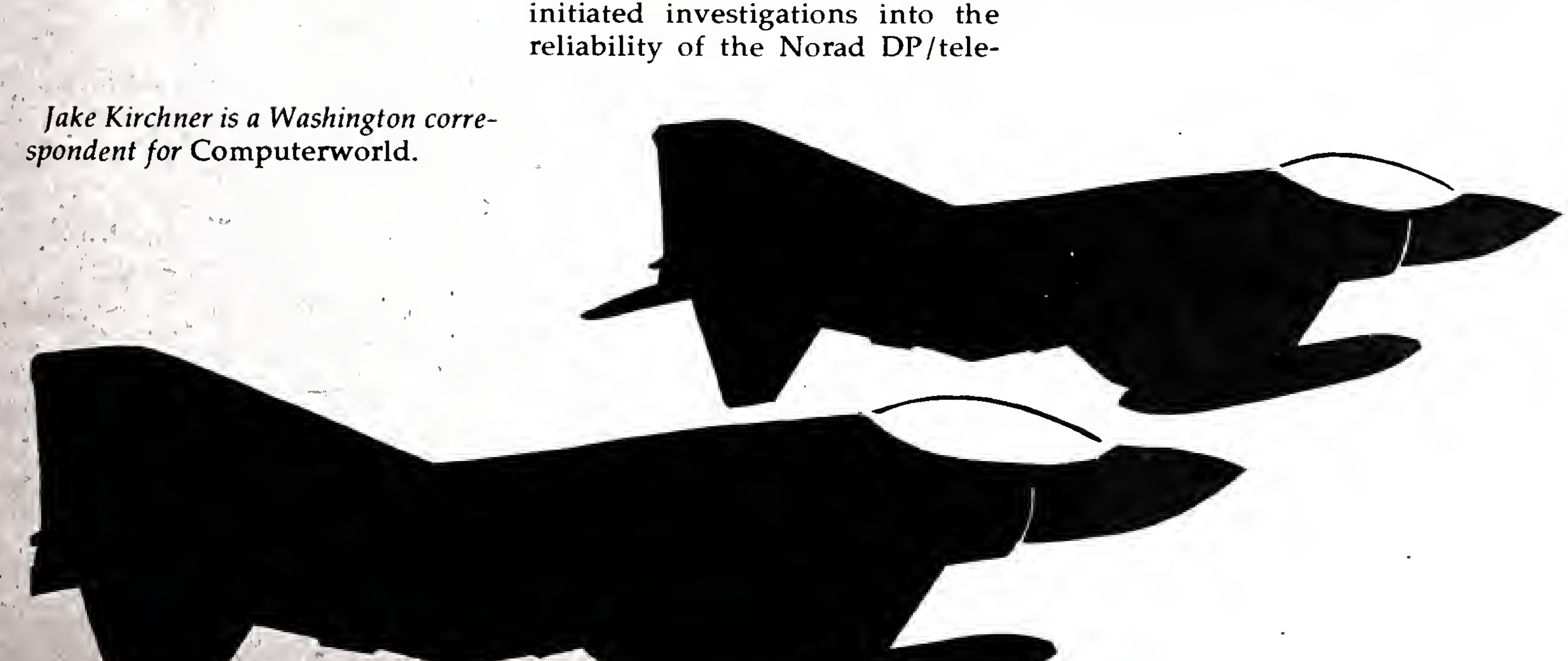
As in Sweden, the issue of vulnerability had not escaped the attention of other nations, such as France, Spain, Norway and Canada, which were voicing concerns that centralized systems are open to strikes or terrorist attacks; that civil liberties, privacy in particular, are compromised by reliance on far-flung networks of computer data bases; and that economic health is hurt by jobs lost when data is processed outside national borders.

This growing awareness of the "vulnerability problem" persuaded the Organization for Economic Cooperation and Development (OECD) to convene a special conference on the topic in Siguenza, Spain, in May 1981.

The U.S., as an OECD member, sent a delegation to Siguenza, but not without some trepidation. The U.S. government was already well aware that American multinational corporations were very sensitive about this issue — and for good reason. American computer manufacturers are the world's main suppliers of hardware and software; these vendors have much to lose if other countries mount a concerted effort to cut reliance on foreign suppliers. The same holds true for American vendors of data processing and communications services, who were already meeting resistance abroad to American-based processing of foreign data.

Even more disturbing to U.S. firms are the sporadic but persistent foreign movements commit-

Jake Kirchner is a Washington correspondent for Computerworld.



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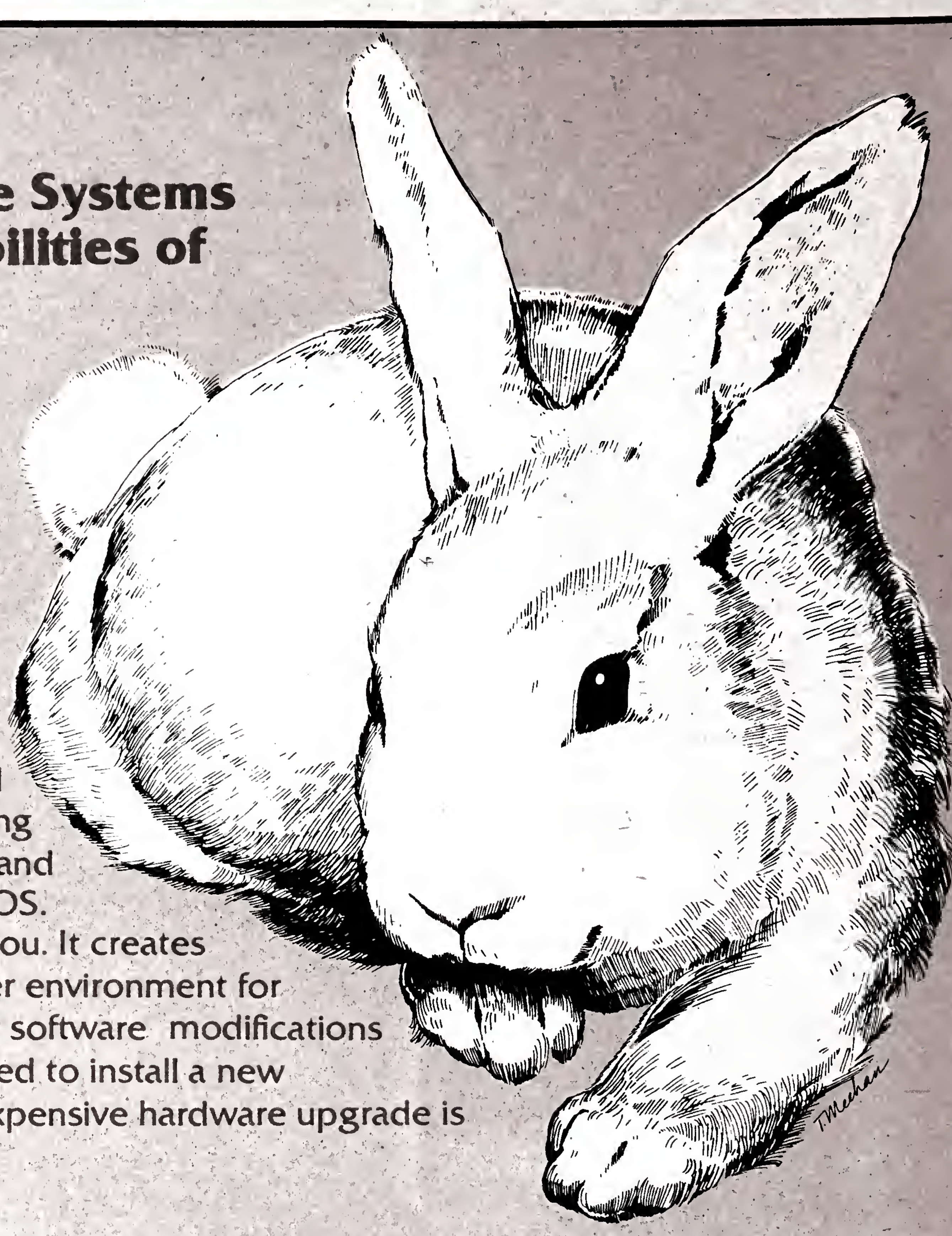

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So the American delegation arrived in Siguenza with a mandate to play down the vulnerability issue. The real problem, they told their OECD trading partners, is one of computer security. If proper safeguards are applied to systems, they pointed out, technology can make a nation safer from enemy attack, healthier economically, raise its standard of living and allow its government to protect personal freedoms better.

No Hard Sell

The meeting, it turned out, was an eminently rational discussion of the problems associated with increasing computerization. The Europeans were not such a hard sell after all, the U.S. delegation found. Reporting that the attending OECD members were not bent on technological reversal or isolationism, a State Department official said after the meeting that "the Europeans have really caught religion on computer vulnerability."

If the Europeans were receptive to the Americans' particular brand of proselytizing on the benefits of automation, there is also evidence the continental cult of computer vulnerability has found a number of votaries in this country. Coincident with the Siguenza meeting, a number of official U.S. activities reflected increasing concern here at home about the vulnerability of computerized societies:

- Congressional committees were at that time completing studies of the computer failures plaguing the Federal Aviation Administration's (FAA) air traffic control system. The FAA computers had been implicated in several near-miss incidents involving large, fully loaded jetliners. This added impetus to Congress' push for a complete multibillion-dollar restructuring of the system for both safety and economical reasons.
- The National Security Agency, reacting to a perceived need for more trustworthy computer systems for defense and intelligence applications, was establishing a Computer Security Technical Evaluation Center to work with private industry to increase commercial availability of secure hardware and software.
- Both inside and outside the government, proponents of civil liberties were raising new objections to decade-long attempts by the Federal Bureau of Investigation to design a nationwide telecommunications system for exchanging computerized criminal history information. The most recent system proposal, the FBI's detractors claim, still threatens the privacy and constitutional rights of U.S. citizens.
- The Defense Department was mulling over a consultant's study that claimed enhanced U.S. reliance on centralized communications facilities could prove disastrous in times of national emergency. Increasing centralization is a major new factor that must be considered in determining the survivability of such systems,

> *'But if the incidents made for some uneasy moments in Washington and Moscow, they did not go unnoticed in the capitals of America's European allies either. In the British Parliament, for example, the events precipitated a round of grave rhetoric on doomsday devices and spine-chilling scenarios of nuclear horror.'*

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Vulnerability

the SRI International report said, tossing off the comment that "when communications fail, people die needlessly."

- The Congressional Office of Technology Assessment (OTA) was completing a report on the implications of growing national reliance on large computer-based information systems. The OTA report concluded: "When society becomes highly dependent on the reliable functioning of single integrated technological systems or small collections of such systems, the possibility of a 'domino-like' collapse of several of the individual connected units could .... be disastrous."

Those are just some of the more obvious examples of U.S. officialdom's recent greater awareness of the vulnerability issue. A more striking example came three months after Siguenza when the same State Department offices responsible for our participation at the meeting produced a policy draft that starkly outlined the vulnerability problem as it confronts the U.S.

"Communications and information technologies play crucial roles in maintaining our national security," the State Department concluded. It declared that any international arrangements the U.S. agrees to in the areas of information and communications technology must not "adversely affect its continuing ability to contribute to the maintenance of national and international peace and security."

Vulnerability Bandwagon

America, it seems, is jumping on the vulnerability bandwagon. Maybe the European arguments have been more persuasive than the U.S. originally supposed. Or perhaps the vulnerability issue is one that cannot be ignored. If so, it begs the question of whether there really is a "vulnerability problem."

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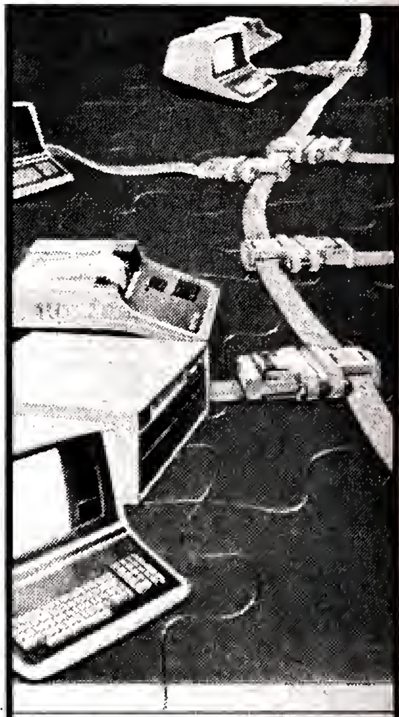

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Agrarian societies are completely vulnerable to the vagaries of the weather, industrial societies to the uncertain availability of energy sources.

Even the most cursory examination of computer technology shows occasional system failures are all but inevitable. If there is a vulnerability *problem*, it is that the idiosyncratic vulnerability of this new and exploding technology is not always recognized by those who control it or by those who depend on it.

Beyond Security

It is all very well to say vulnerability is only a matter of security — only a matter of locking computers in bunkers and vaults, encrypting communications and handing out passwords. The problems of automation go far beyond that.

When an activity or function is automated, it is changed dramatically and irrevocably. Computers have fundamentally changed the way we live — the way we work, travel, educate our children, pay our bills, maintain national defense, govern ourselves, how we relate to our public and private institutions and to each other.

> *'As much as computers have changed our concepts of business, recreation and art, they have changed our concepts of freedom and what is moral and immoral. If all of the information most valuable and necessary to an individual or group of individuals can be converted to data on a computer tape, the wielder of a magnet becomes a monstrous criminal. For all the many ways computers have enhanced our lives, they have presented a thousand new ways to hurt us.'*

As much as computers have changed our concepts of business, recreation and art, they have changed our concepts of freedom and what is moral and immoral. If all of the information most valuable and necessary to an individual or group of individuals can be converted to data on a computer tape, the wielder of a magnet becomes a monstrous criminal. For all the many ways computers have enhanced our lives, they have presented a thousand new ways to hurt us.

A popular phrase in the 1960s held that you don't need a weatherman to tell which way the wind blows. Today you don't need Alvin Toffler to tell you we are living in a new kind of society. We come in contact with computers dozens of times each day.

Most of us recognize we are living in the information age; and if we don't always approve of it, most of us are at least resigned to its inevitability.

Modern societies will be more vulnerable only to the extent that they do not embrace and learn to adapt to sophisticated information technology.

If we are to rely on multibillion-dollar electronic warfare systems for our defense, we had better produce enough Ph.D.s to operate them. If we are going to base our economic system on electronic funds transfer, we should be sure that a company or bank or whole region will not be ruined financially by a misplaced bit.

We need secure systems for air traffic control, energy distribution and all types of telecommunications. We need unrepressive systems for law enforcement and friendly systems for the office environment.

It may do more harm than good if we put a computer terminal in every home and an electronic calculator in every schoolboy's pocket if we do not think about the side effects of automation.

Looking Ahead

The near-term outlook, however, is for more ad hoc consideration of these and related issues. Systems will be built, and as they fail they will be patched and redesigned. But in the long run, computers allow too many things to happen too quickly to allow a hit-or-miss approach to technology, economics or diplomacy to be perpetuated.

Those who mandate new systems, those who build them and those who operate them should not need to have a bomb dropped on their heads before they are receptive to the necessity of coming to terms with the extraordinary and varied new modes of vulnerability they are visiting on the common man.

For those who govern us, the situation has been clearly stated in the recent OTA report: "The nature of risk is being changed by much of the new high technology on

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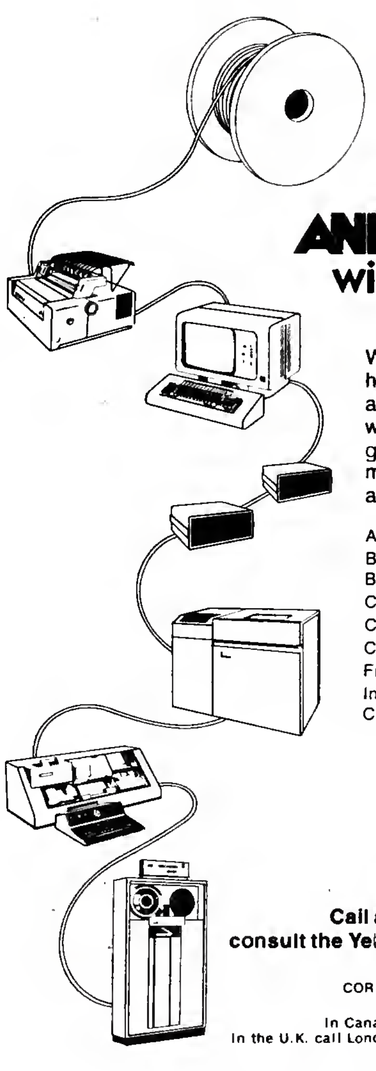

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which modern society depends." The study documents in detail the many technology and public policy issues related to computer-based information systems that Congress must address in the not-too-distant future. These include the technology's implications for productivity and employment, privacy, security, government data processing, constitutional rights and government regulation.

'It is not too much to expect our elected representatives to take a long-term look at the technology and ask some interested questions in the committees that oversee areas relevant to new technology.'

Because our form of government, for all its many branches of bureaucracy, is not nearly as centralized or paternalistic as those of the European socialistic democracies, it would be naive to expect the U.S. to appoint any counterpart to the Swedish high-level committee on vulnerability.

The outlook for technological enlightenment on Capitol Hill, however, is mixed at best. Although the OTA study was initiated at the request of several congressional committees, most members of Congress, passing through offices jammed with word processors, color graphics terminals, minicomputers and high-speed electronic printers on their way to casting their votes via electronic voting systems, have only the vaguest appreciation for the technological revolution taking place around them.

There are indications that this situation is changing. After years of ponderous work, there is every expectation that Congress will pass a new communications act next year. This legislation will force many congressmen to face for the first time complex policy issues related to advanced DP/telecommunications technology.

In addition, committees in both the Senate and House have shown great concern for the systems needs of the next generation of air traffic control, Social Security administration and military command, control and communications.

Some congressmen have raised questions about the privacy implications of proposed Internal Revenue Service computer configurations and more powerful FBI systems. And a House subcommittee recently held extensive hearings on the possible health hazards of CRT terminal use.

On the downward side, the federal computer crime bill has languished in Congress for years, mainly because no one there knows quite what to make of it or what to do with it. Moreover, many congressmen equate expenditures for computers with expenditures for typewriters, desks, brooms and mops — just another line item in the annual appropriations battle.

The Executive Perspective

At the other end of the federal government, the White House recognizes there are serious deficiencies in executive agency DP management. But the Reagan Office of Management and Budget, beset with other worries it assigns higher priorities, seems less willing than previous administrations to come to grips with the problems.

The immediate outlook for the vulnerability issue, then, is that it will be addressed at a more parochial level. Security consultants will become rich and much in demand as individual companies and segments of the economy attempt to deal with the most pressing aspects of computer use.

There will be large, and perhaps on occasion, spectacular computer crimes and systems failures. But there will also be amazing advances in computer technology that will remove many of the current vulnerabilities while no doubt creating new, unforeseen and even more confounding ones. Eventually, society must confront the implications of the information revolution, for every year they become more inescapable.

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Integrating Voice and Data

Sharing the Lines

By Bruce Hoard
CW Staff

The fine art of telecommunications technology moves relentlessly. No sooner is one new concept introduced than another innovative idea comes along.

Two of the more recent stars are the voice/data computerized private branch exchange (PBX) and the digital termination system (DTS) — seen by many as the missing link in the digitization of America.

For many years before the advent of sophisticated computers, the voice-only analog PBX ruled supreme in the office. One box was used to locally link the telephones of a company with the outside world and each other.

Even after the introduction of computers, voice and data remained in separate domains. For years, the telephone was used to carry on a conversation and the computer to process data. The electronic integration of the office has changed that; the drive is on to concentrate voice and data together.

Perhaps "drive" is too strong a word. According to John Malone, president of the Eastern Management Group, the most prominent manufacturers of "second-generation" PBXs, which he defined as those with built-in voice/data capabilities, will have produced only about 20 machines each during 1981.

One manufacturer that could break that mold is Wang Laboratories, Inc., Malone said, adding that he expects the word processing giant to have a voice/data PBX alpha test site by the end of next year.

By the end of 1982, digitized voice/data PBXs will account for about 1% of total PBX sales. And by 1985, 95% of all PBXs sold will be digital and 80% of those will be voice/data machines, Malone predicted.

By 1990, the analog PBX will be virtually extinct, according to a study entitled "The Ten Year Market for Interconnect PBXs" released in May by Malone's Morris Plains, N. J.-based firm.

Most voice/data PBXs simultaneously support voice and data transfer on between 150 to 4,000 or more lines. The total installed cost of such a voice/data device typically runs around $1,000 per line. Installation alone may be two to three times more expensive than the hardware. Most machines push voice and data at speeds ranging from 110 bit/sec to 64K bit/sec.

Not everybody is approaching the market in the same way. Some vendors have introduced PBXs originally designed to handle voice and data. Those are the first-generation models referred to by Malone. Others have entered the market by retrofitting their current offerings to support a digital voice/data handling capability. Malone called these "second-generation" machines.

Datapoint Corp., United Technologies Corp., Anderson Jacobson, Inc. and Exxon Corp.'s Intecom, Inc. have taken the first approach. The Datapoint ISX, the United Technologies' Lexar Corp.'s LBX, the Anderson Jacobson IOX-1000 and Intecom's IBX were all designed from the ground up to switch both voice and data.

Northern Telecom, Inc. offers voice and data switching through an add-on module to its SL-1 Business Communications System. Rolm Telecommunications Corp. did likewise with the Model 6000 CBX as did GTE Telenet, Inc. with its GTE-1000s and GTE-4600s and Harris Corp. with the D1200.

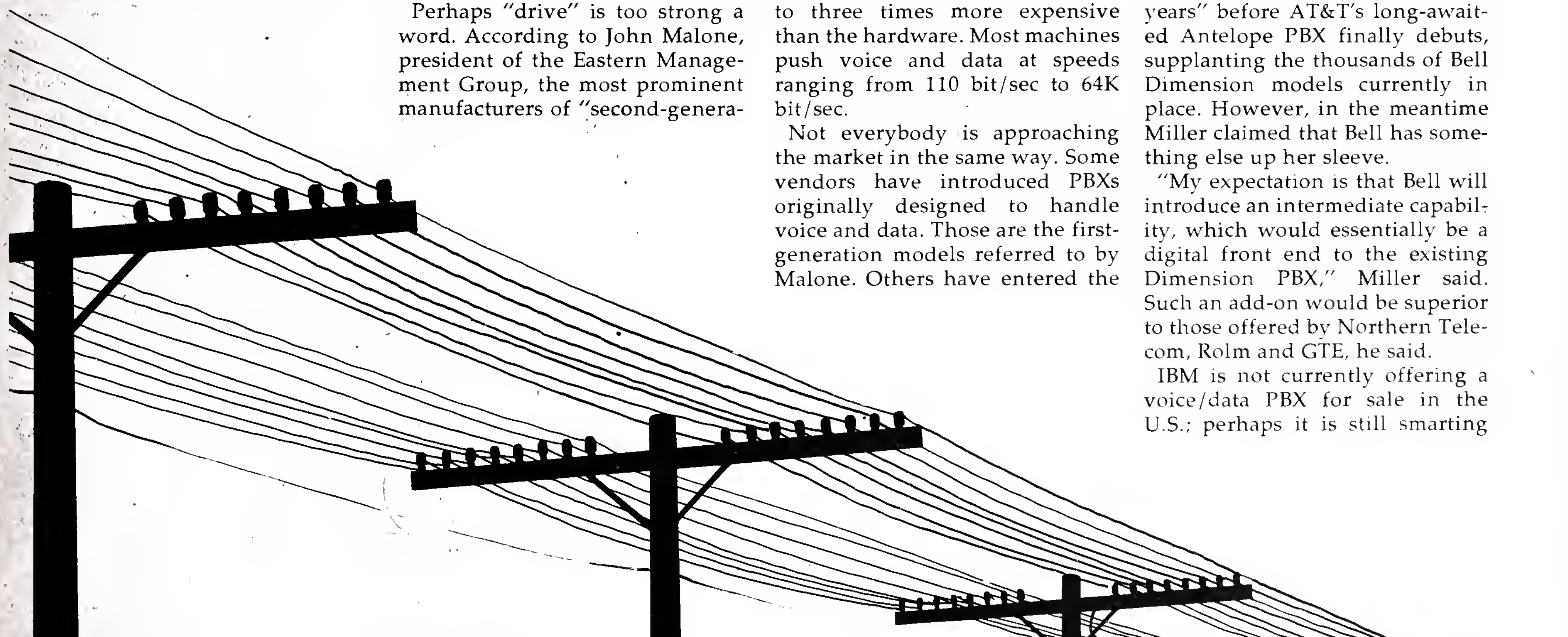
So much for the supporting cast. Now, on to "the two most important players," as described by Richard Miller, vice-president of the Diebold Group in New York.

Miller believes it will be "several years" before AT&T's long-awaited Antelope PBX finally debuts, supplanting the thousands of Bell Dimension models currently in place. However, in the meantime Miller claimed that Bell has something else up her sleeve.

"My expectation is that Bell will introduce an intermediate capability, which would essentially be a digital front end to the existing Dimension PBX," Miller said. Such an add-on would be superior to those offered by Northern Telecom, Rolm and GTE, he said.

IBM is not currently offering a voice/data PBX for sale in the U.S.; perhaps it is still smarting

Bruce Hoard is a senior editor of office automation at Computerworld.



Sharing the Lines

from its experience with the 3750 "Carnation," which is sold in Europe. Of the Model 3750, T. Vincent Learson, former IBM chairman and chief executive officer, said: "That machine was a dud, is a dud and always will be a dud."

Despite its passive approach to the market, Miller rates IBM as one of the two most important forces in the field. He described the importance of the PBX to the future of Fortune 2000 companies and said of IBM, "They have some basic decisions to make."

Malone thinks that next year Bell will go beyond Miller's expectations. He believes that some form of Antelope will become a reality in 1982. In Malone's opinion, Miller based his forecast on a request for a proposal the Department of Defense placed with Bell for a large quantity of digital PBXs for the federal government.

Bell's manufacturing arm, Western Electric, proceeded with a design for a digital front end for the Dimension "and it caused the industry to begin to speculate that a product that would come out during '82 would really just be a digitized front end for the Dimension," Malone said, adding that the government deal eventually fell through.

Expectations for Antelope

Many people expected Antelope to be a very sophisticated PBX that would be 50% computer and 50% PBX, he maintained.

"The version that we expect to see on the marketplace next year will in fact be in essence that product," Malone said. " However, we expect it to come out without all of the frills. In other words, what you'll find is that next year we'll experience the chassis, and by 1985 or so, you'll find the Corinthian leather seats going in and the power windows."

In other words, do not expect protocol conversion and DP capabilities until about 1985.

The user community can expect IBM to signal its intent to jump into the voice/data market by making its analog Model 1750 available here early next year, Malone said. The 1750 has been sold in Europe for the past two years.

IBM will unveil a complete voice/data PBX by 1985, Malone predicted.

Miller pointed out there is no installed base for the Datapoint ISX or Intecom IBX. Some Lexar LBXs are installed; but the LBX was originally designed for the requirements of Citibank when it was a subsidiary of the New York financial institution.

According to Miller, a PBX in a banking environment faces a "higher intensity of communications traffic and more requirements for more immediate updating of quantitative information" than might be found in most business environments.

He praised the work done by Northern Telecom engineers on the SL-1 add-on module and said he "sees more coming" from the company.

Of the Rolm add-on, he said it may "load up" under heavy data usage and warned, "It's not as promising as some of the Rolm people make it out to be."

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Sharing the Lines

Comparisons are beginning to be made between voice/data PBXs and local-area networks as both technologies compete for supremacy in the office communications arena. Miller indicated that local-area networks have some serious flaws in that area.

Local-area networks basically supply digitized coded information using a single manufacturer's protocol and "you really have to search for some of the applications before they're really justified on a costs basis and there are fewer of them than you probably think," he opined.

The key capabilities missing from local-area networks are access to compound files, voice features and freedom from manufacturer protocols, Miller claimed.

Users Reluctant

Users are reluctant to buy into this technology-driven market because they still do not believe anyone can give them a voice/data switch that will not succumb to the frequent downtime associated with computers, Tom Elliot, research manager for office automation with International Data Corp., Framingham, Mass., noted.

"People don't think of telephones and computer terminals as being intimately linked," he said. "The phone always has to be up and running. People build a little downtime into their thinking about hardware, but nobody builds in telephone downtime. You're really outraged when the phone goes down."

In the increasingly incestuous world of communications, it is no surprise that voice/data PBXs and DTSs should be related. By the late '80s, the voice/data PBX may end up on the receiving end of DTS, which seeks to turn the quagmire that is analog metropolitan distribution into a high-speed, digitized broadband highway.

In the beginning, DTS vendors will offer local distribution of data received from satellite carriers. Data will be received from the satellite at earth stations and central processing facilities located atop big city skyscrapers.

From there, it will be broadcast to users via a radio antenna on their roofs and a transceiver device on their premises. All of the hardware involved will lease for approximately $8,000 a year, according to Jerry Lucas, president of Telestrategies, Inc. and a knowledgeable market observer.

The Federal Communications Commission (FCC) laid down guidelines for DTS in January. Its ruling allocated 130MHz of radio frequency divided into two basic parts: intercity terrestial and/or satellite facilities, already provided for in other FCC rules, and the DTS local-distribution network. The allocated frequencies are in the 10.55- to 10.68GHz band.

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Sharing the Lines

130MHz band for the links connecting subscribers to local nodes [CW, Jan. 26]. Another 30MHz will provide internodal links and the remaining 30MHz will be saved for the future.

Providers of extended DTS will receive 40MHz of the end-link frequency allocation, while those offering limited DTS will receive the other 30MHz.

The group offering extended DTS must provide services in at least 30 cities. Limited-service end links will have a subdividable 2.5MHz bandwidth in either direction, while extended service links will be 5MHz.

Up to four extended service carriers and six limited services carriers will be licensed in each city. In the case of competing applications, extended service carriers will be favored.

The FCC staff is preparing a notice of proposed rule making that will recommend to the commission means of allocating a second frequency band — 17.7GHz to 19.7 GHz — for DTS. The proceeding is, among other things, intended to provide additional transmission capacity if and when the 10.55GHz to 10.68GHZ band becomes loaded.

So far, nine companies have applied to the FCC for licenses to operate the microwave local-distribution facilities in more than 30 cities. The nine include such highly recognizable names as Tymnet, Inc. and Satellite Business Systems and the less known Contemporary Communications Corp. and National Microwave Interconnect Co.

Origins of DTS

Lucas traced the DTS idea back to work done by Xerox Corp. and the Departments of Defense's Advanced Research Agency during the mid-'70s. The two groups eventually collaborated on the Xten communications network, the precursor of today's DTS. Xten never got off the ground and was finally cancelled earlier this year. However, the idea of Xten lived on.

"The idea is sound," Lucas said. "The technology is digital microwave radio coupled with store and forward data communications equipment. It's just a natural marriage between the two. It's the kind of thing that has a lot of applications in the nine-dot-six-plus market."

By "nine-dot-six-plus," Lucas meant the 9,600 bit/sec telephone company local loops, which he said are still very competitive. However, at higher transmission speeds ranging from 19.2K bit/sec to 1.5M bit/sec, the telephone companies provide far fewer services, he added.

Some of the services that will be bolstered by DTS include electronic mail and high-speed facsimile, he added.

In order to cost-justify DTS, a user should currently be paying for two 9,600 bit/sec or one 56K bit/sec circuit coming out of his building, he said. That is the break-even point.

The first DTS services will be coming on-line by the end of next year, Lucas said, adding that the time period between 1982 and 1984 will be very active in terms of developing customers and features. By 1984 or 1985, DTS carriers will offer users data PBXs for more sophisticated applications, he said.

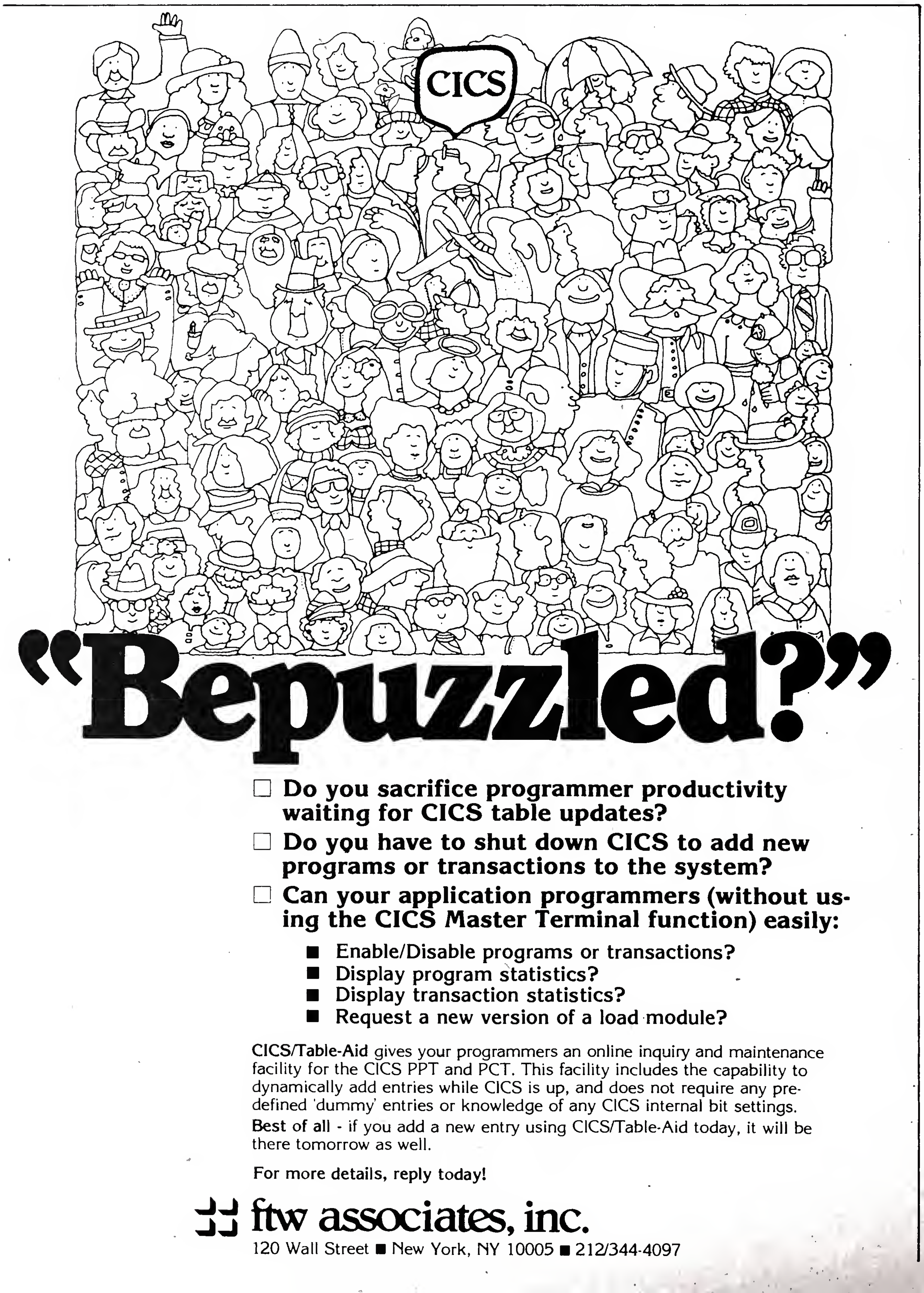
Lucas also predicted that airwaves around such major metropolitan areas as New York City, San Francisco and Atlanta will become saturated quickly, leading to the implementation of CATV coaxial cable to perform the local distribution.

"Cable is a much more cost-effective way of doing this," he explained.

One kind of cable that is not cost effective because it is incompatible with DTS is baseband coaxial cable, most commonly associated with Xerox's Ethernet.

"Ethernet is just the wrong kind of system to interface with DTS," Lucas commented. "It was just amazing that Xerox carried both Ethernet and Xten as long as it did because they're basically incompatible."

The two leading DTS hardware vendors at this time are Nippon Electric Co. of America (NEC) and Local Digital Distribution Co. (LDD) of Rockville, Md. According to Lucas, NEC leads LDD in its digital microwave transmission capabilities; but LDD offers more sophisticated DP and network management facilities.



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DP Entrepreneurs

The New Moguls

By Tim Scannell
CW Staff

They are extremely loyal to friends and business associates, but would not hesitate to step on a few competitive fingers in their scramble to the top.

They love to gamble on a new idea, but would probably not invest time or money in a scheme that did not have a healthy chance for success. And although they have high IQs, they were most likely average students in school and garnered most of their business savvy on the streets rather than in a classroom.

"They" refers to today's entrepreneurs, who are noted for their lack of respect for strict three-piece-suited management styles and conventional business tactics. And they are responsible for much of the skyrocketing success of the high-technology computer industry.

Contrary to popular belief, although most entrepreneurs agree with the Horatio Alger success formula of hard work and self-reliance, few rely on just those two forces to achieve their goals.

Early in their careers, entrepreneurs are most probably viewed by their superiors as annoying square pegs trying to squeeze into unrelenting round holes — mavericks who might have a good idea, but who do not want to take the time to wade through corporate red tape to reach success.

"A lot of entrepreneurs are impatient in corporations when they see a market or when they see a potential for a product and they can't convince the company to do it," according to Carl Burgen, editor-in-chief of *Venture, The Magazine for Entrepreneurs.*

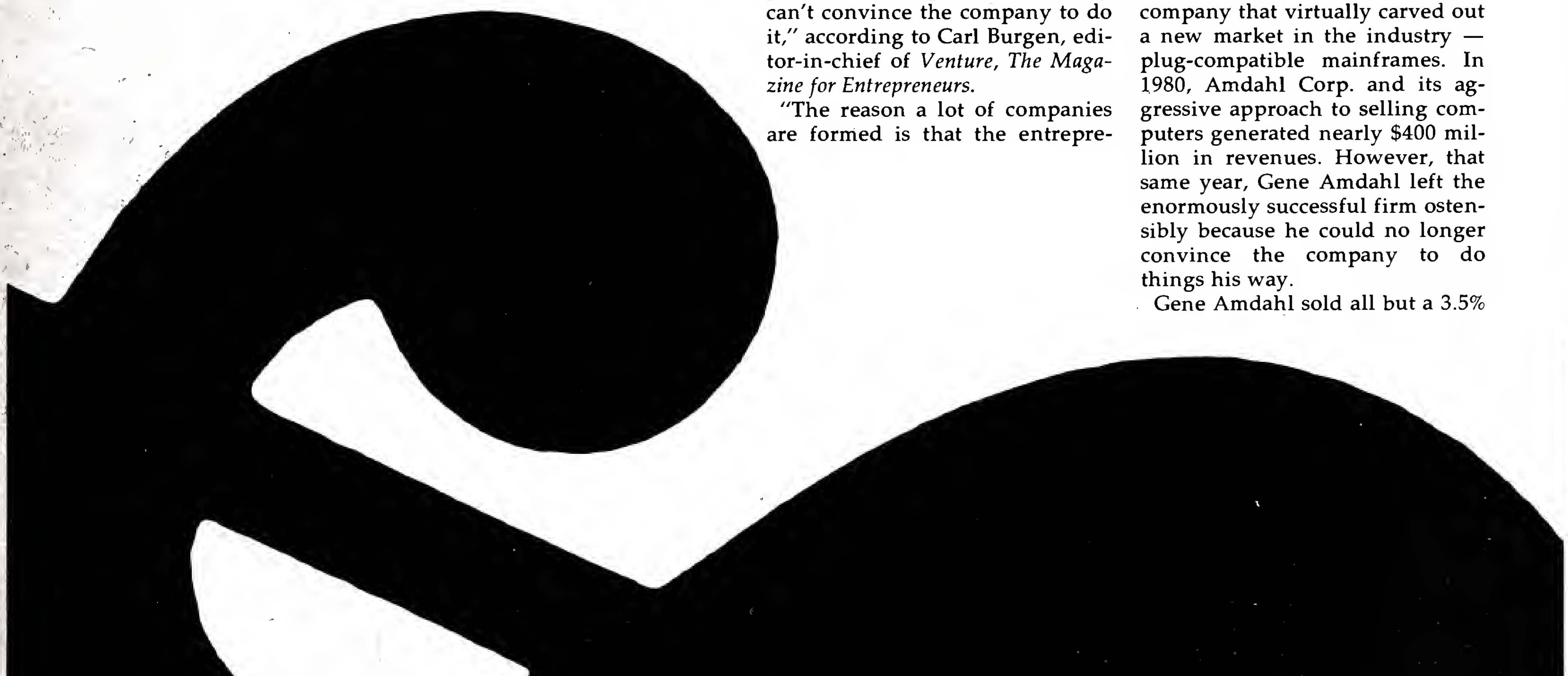
"The reason a lot of companies are formed is that the entrepreneur tries to get the company he is working for to develop a market and simply can't do it. So, he goes out and does it on his own to prove a point more than to make money," Burgen explained.

While money is an undeniably important factor to anyone starting a new company or blazing a new market trail, it is not usually the driving force behind the entrepreneurial psyche. In fact, a lot of entrepreneurs in the computer industry have taken the millions accrued in one highly successful operation and invested it in another — sometimes at the risk of losing a portion or all of that initial investment.

In 1970, Dr. Eugene Amdahl turned his back on a highly successful career at IBM and founded a directly competing computer company that virtually carved out a new market in the industry — plug-compatible mainframes. In 1980, Amdahl Corp. and its aggressive approach to selling computers generated nearly $400 million in revenues. However, that same year, Gene Amdahl left the enormously successful firm ostensibly because he could no longer convince the company to do things his way.

Gene Amdahl sold all but a 3.5%

Tim Scannell is a senior editor of hardware at Computerworld.



interest in his company and started up another company, Trilogy Systems Corp., based in Santa Clara, Calif. Oddly enough, the new company's computers — still in the development stage and due to be shipped in 1984 or 1985 — will be designed not only to compete with IBM's products, but with Amdahl Corp.'s systems as well.

Earlier last year, Amdahl's son Carl — who is cofounder of Magnuson Computer Systems, Inc., another IBM competitor — joined his father at Trilogy and together they plan to relive the excitement of starting a new company.

True entrepreneurs thrive on challenge, which is why it is not unusual for them to leave a business that has become successful and to start all over again with a new company.

"If they are successful, they tend to get bored just managing a business," Burgen said. "If they've had success in doing it once, they are more confident in going out and doing it again — and not always in the same line of business."

Founding one company, nurturing it until it is successful and then leaving to start another is not an unusual phenomenon in the computer industry. In 1977, Alan Shugart left Shugart Associates — a company he had founded in 1973 — to start Seagate Technology, Inc. And in 1969, J. Reid Anderson, who cofounded Anderson Jacobson, Inc. just two years earlier, jumped ship to found Verbatim Corp.

Besides challenge, most entrepreneurs return to the starting block on the industry game board to regain control over their operations. For instance, rather than depend solely on funds provided by venture capitalists, the Amdahls invested $10 million of their own money in Trilogy. They fully intend to keep at least 50% of the new company's equity.

J. William Poduska, a cofounder in 1972 of Prime Computer, Inc. and now founder, chief executive officer and president of Apollo Computer, Inc. in Billerica, Mass., also believes in keeping a large chunk of the company, and its control, in his pocket. Although Apollo has five venture capital firms involved in its financing, Poduska and his seven partners have a 31% ownership in the company. That is considerably more than was reportedly left to the founders of Prime after its rounds of venture financing.

'Executives are concerned with . . . money, fringes and stock options. This is how they keep score. However, an entrepreneur cares about the fulfillment of his dreams and the actions that come from his impulses.'

While the computer and other fast-growing high-technology industries are ripe with people who appear to be entrepreneurs or who are involved in entrepreneurial-like projects, there are not as many true business mavericks as it may seem. There is a thin, but highly discernable line separating an effective manager with good business sense from the genuine entrepreneur.

"Executives are concerned with such things as money, fringes and stock options. This is how they keep score. However, an entrepreneur cares about the fulfillment of his dreams and the actions that come from his impulses," according to Dr. Mortimer R. Feinberg, chairman of

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Feinberg, a professor emeritus of Baruch College at the City University of New York, and author of numerous articles and books that deal with the management psyche, describes today's entrepreneurs as the "John Waynes" of the business world. "An entrepreneur is a very good fighter [who] doesn't believe in losing. If he can't sell soap, then he'll sell bath powder; if he can't sell bath powder, he'll sell toilet paper," he explained.

Rather than chart success by a swelling bank account, true entrepreneurs keep score by beating the competition or reaffirming just who is pulling the strings in a negotiation.

"I've seen these guys negotiate the price of something by close to a $100,000 and then turn around and say, 'O.K., send that money to St. Mary's Hospital'," Feinberg added. "They love to deal. To them, it's the joy of the chase."

A lot of managers and executives in multibillion dollar corporations are mistakenly called entrepreneurs because they carry profit-and-loss responsibility or indulge in occasional "risk-taking" management. However, these people are not true entrepreneurs, Burgen said.

While an entrepreneur can certainly buy a growing company and still be an entrepreneur, "someone who simply goes into a corporation as a manager and runs it well is not necessarily an entrepreneur," he claimed. The mark of a true entrepreneur is someone who can take absolutely nothing, or just the barest corporate essentials, and build that into a highly successful venture. "A lot of managers might be very capable in what they do, but would not know where to begin to start something from nothing."

Although many entrepreneurs give birth to a new company and stick with it for the rest of their careers — such as Dr. Edwin H. Land, father of instant photography and head of Polaroid Corp. — far more gladly sever the founding umbilical cord when a company becomes more corporate-oriented and requires a firmer management hand.

Eventually letting go of corporate control is a perfectly natural progression for the typical entrepreneur. Although they sincerely want success to occur, most become bored when it does and the initial adrenaline-pumping challenge fades. Abdicating power and control has more to do with the entrepreneur's basic psychology with than the company's growth, Feinberg stated.

"Entrepreneurs are terrible in terms of organization. They know nothing about structure, they're terrible in selecting people and they have no concept of individual differences," Feinberg claimed. "That is why, at a certain point in time, the entrepreneur has to let go and give his reins to a real manager."

Not surprisingly, most managers for entrepreneurial ventures are spirited away from such tightly managed companies as IBM, which — if the number of companies that have recently turned to the computer industry giant for executive talent is any indication — has proven to be a prime feeding ground and raiding target for future corporation heads.

Unfortunately, the ceremonial passing of the leadership helm is not as simple as handing over a firm's charter along with the keys to the executive washroom. Problems do oc-

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cur after the entrepreneur has packed his bags and gone to more challenging pastures.

In many cases, a company that was prosperous under the founder's guiding hand is less than successful when a new manager attempts to run the firm strictly by the management book. When this happens, employees sometimes rally against the new powers-that-be, a phenomenon Feinberg likens to medical "tissue rejection."

If a company should eventually fail, those who were under the old entrepreneurial regime usually will place the blame on too much delegated authority, Feinberg pointed out.

Unlike mere mortal managers, entrepreneurs have an almost devil-may-care attitude toward failure. In fact, some literally do not know the meaning of the word, preferring instead to look at financial faux pas as lessons that could be used in future schemes and ventures.

This image of the corporate swashbuckler may make for a romantic business story, but it wreaks havoc with the people — particularly the venture capitalists — who back a dreamer's ideas with cash.

Unfortunately, there is no easy formula for picking the entrepreneurial winners or even weeding out the true entrepreneurs from the would-be movers and shakers.

There are also no guarantees that if an entrepreneur was successful his first time around, the second venture will do equally as well. For example, Royden C. Sanders Jr. founded Sanders Associates, Inc. and built that firm into a $155 million company before he was voted out in 1975. However, his second venture, R.C. Sanders Technology Systems, Inc., was not so fortunate. Although analysts and financial backers had high hopes for the company's success, it ran into trouble soon after its launch. It eventually ran aground and earlier this year reorganized and came out of a Chapter 11 bankruptcy.

However, these entrepreneurial horror stories have not stopped venture capitalists from sinking millions of dollars into new start-ups. In 1981, venture capitalists invested more than a billion dollars in high-technology companies, a good portion of this in new start-ups, according to *Venture Capital Journal*, a publication based in Wellesley, Mass. This compares with a total of $400 million invested just four years ago.

Although venture capitalists do not swear by any thumbnail formulas, there are some early signs that identify rising entrepreneurial stars.

As expected, most entrepreneurs are fiercely competitive. But they are also extremely loyal to the people who stuck by them during the lean years and are not apt to do anything to jeopordize that bond.

Also, while all entrepreneurs have a fair degree of intelligence, most have chalked up a rather mediocre academic career, garnering more Cs than As during high school and college. "Intellectuals have 14 reasons why they can't do something, whereas entrepreneurs are unifocused."

Presently, there seems to be a glut of actual and would-be entrepreneurs, especially compared with the number who were around about a decade ago. However, with today's tight money situation and rising credit terms, it is tougher for present-day entrepreneurs, and even harder for the entrepreneurs of tomorrow, to get that first financial foothold.

But to a true entrepreneurial trailblazer, these obstacles serve only to increase the challenge and to make the financial golden fleece that much more tantalizing.

Finally, it is no great surprise that the U.S. has the greatest number of entrepreneurs and, therefore, the greatest amount of entrepreneurial activity. Despite the presently popular rules of *Theory Z* and the 300-year-old teaching of Japanese samurai Miyamoto Musashi (*A Book of Five Rings*), the U.S. is still the best training ground and management greenhouse for once and future entrepreneurs, Burgen said.

"Looking at entrepreneurs as people who form businesses from nothing, who create new businesses often involving new technology, is the important element," he observed. "And that kind of tradition of risk taking, on your own, simply doesn't exist in other countries."

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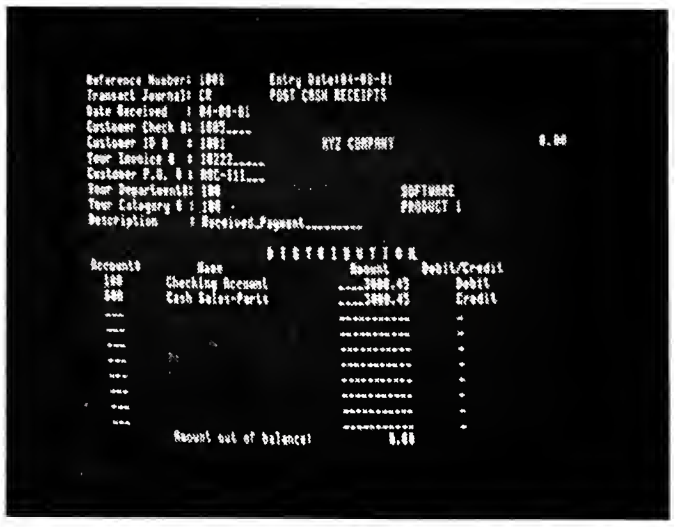

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Mainframers Moving to Software

Shifting Gears

By Marcia Blumenthal
CW Staff

Are mainframe manufacturers developing software primarily to push hardware out the door or do they view system and application software as a healthy new source of revenue?

It seems to be a little bit of both. But whatever the reason, most mainframers are now spending about 50% of their research and development dollars on software — a development largely geared toward making their systems easier to use.

"We are in the throes of getting away from making system software for the DP expert to accommodating the neophyte; in other words, going from the computernik to the noncomputernik," noted Frank Vince, vice-president of product line management at Control Data Corp. This person (noncomputernik) has some knowledge of computing, but has an expertise in some other discipline, he explained.

In taking this approach "we've learned a few good lessons from our friends in the mini and microcomputer area," he said.

CDC is currently incorporating software development tools in its system software offerings. "This is not so much in the languages used by the application developer, but in the software environment for users," Vince continued. These tools cross industry and computer language lines.

One CDC method involves adapting its Plato system, largely associated with computer-aided education systems, for use by application developers. This system allows DP personnel to jump from application development tasks to a prompting mode, which tells them why the parameters of the application are not working, Vince explained.

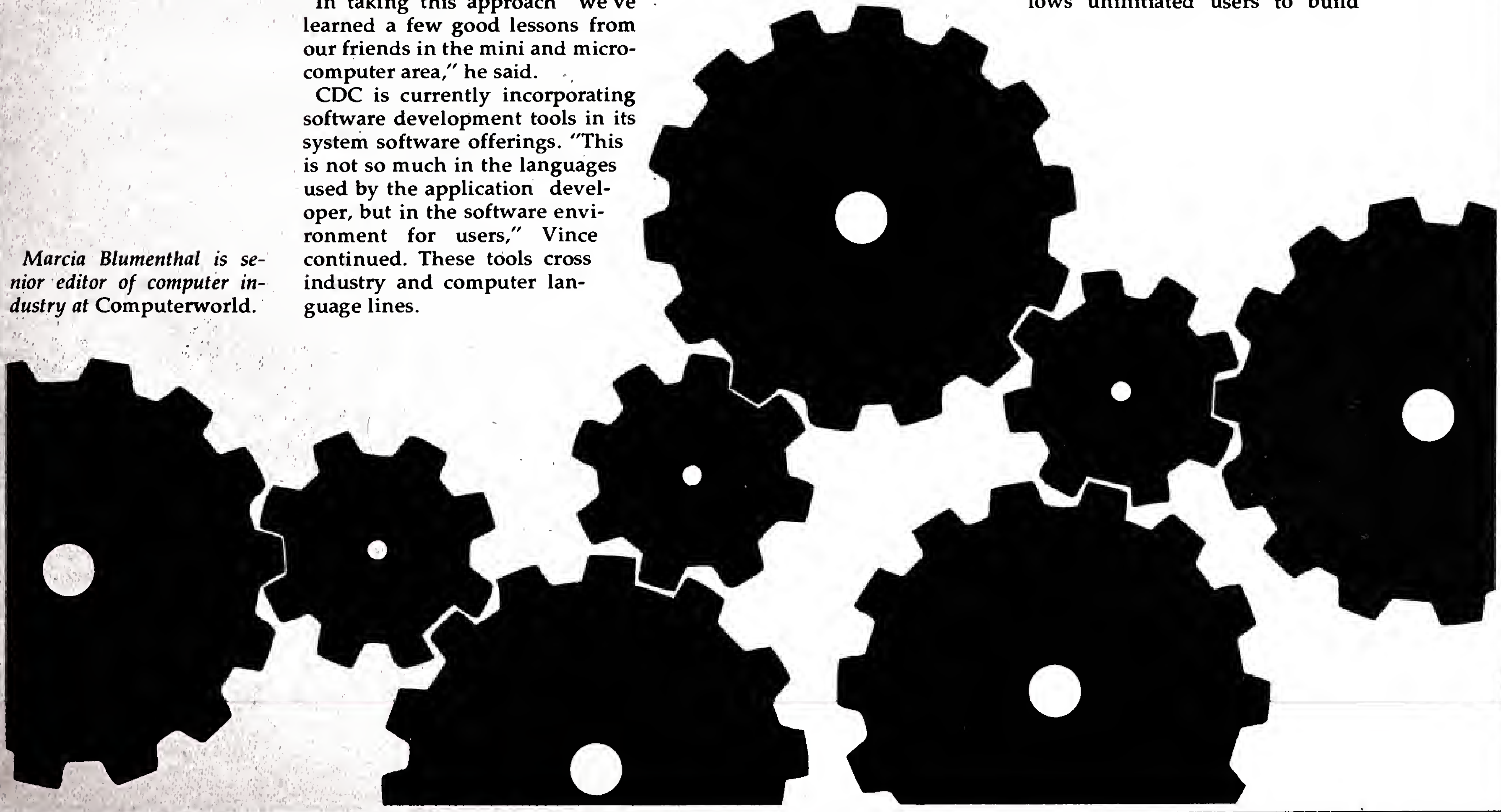
But "the problem in software development is not tools the individual programmer uses, but the management of the code that the programmer produces," Vince continued. There might be 10 different people working on the development of a software application, he explained. Setting up a defined statement of the work that everyone involved in the development process understands requires more than just creating tools for the programmer, Vince said. "This is a real shortfall in our industry," he maintained, inferring that CDC was turning its attention to problem.

Zeroing in on the problems facing less sophisticated users also permeates the thinking at Sperry Univac. That vendor is intent on developing language capability that will allow users to perform local tasks without requiring local DP expertise. "It may make the system very inefficient, but at least users will have access," explained H. Glen Haney, vice-president of strategic planning and development.

In the past, vendors have concentrated on producing highly structured code geared for functional results — a payroll system, for example. Now the thinking is that it might be better if systems were not so highly structured, Haney continued. This approach gives users more accessibility to the system, he noted.

Univac has taken this tack with its Mapper system, developed by a group of employees at the company. Mapper is a language that allows uninitiated users to build

Marcia Blumenthal is senior editor of computer industry at Computerworld.



their own files and structure them according to their needs. Although developed four or five years ago, Mapper was first offered as a package to the company's 1100 series users just a year ago.

Sperry Univac is also using this unstructured approach to create an office automation system it expects to introduce sometime in 1982.

Although IBM declined to be interviewed about its software strategies, in recent months the firm has introduced products that allow users to access systems without local DP expertise. Its Small System Executive/Virtual Storage Extended System for use on 4321 and 4331 processors, features on-line productivity aids, prompters and other procedures that enable users with limited DP skills to install and operate their systems.

Burroughs Corp. has also recently turned its attention to developing tools designed to make its systems easier to use. About a year ago, the company melded its software

and hardware engineers into one unit, according to Ben L. Rouse, vice-president of line of business marketing.

One of the mandates of this group is to produce "enabling" or "environmental" software such as data communications handlers. "Until a year ago, we treated such software as applications," Rouse said, noting that the firm now regards such tools as part of the system software.

The company has also established a corporate committee to determine which of the firm's software can be made easier for the user.

NCR Corp., with its orientation toward transaction processing in retail and bank settings, is highly tuned to the need for user-friendliness, claimed Dennis Peck, assistant vice-president of the General Purpose System Division's product management.

There is a smaller amount of DP expertise in these settings than in the central DP environment. Therefore, systems have to function in an unattended mode and be forgiving if events like a power disruption or fluctuation occur, Peck noted.

Through its "migration path engineering" approach, the operating systems on all three classes of NCR's mainframe systems will soon be transaction-oriented, he said.

During the first quarter of 1982, the firm will announce a new release of its Interactive Multiprogramming Operating System (Imos) called Imos Tranpro for use on its 16-bit minicomputer systems. In addition, NCR will also introduce Tranpro on its Interactive Resource Executive System operating on the company's 32-bit systems, Peck disclosed.

Moreover, during 1982, the company will also release tools it has reserved for internal use until now, he said. One of these is NCRL, a Pascal derivative with which the company has written its high-level operating system, he added.

IBM Rivals Join the Hunt For Applications Software

By Marcia Blumenthal
CW Staff

When IBM goes out hunting for applications software it is big news, one executive of a competing mainframe manufacturer maintained during a recent interview with *Computerworld.*

But foraging for applications software to fill those black boxes has been a major concern of IBM's mainframe competitors for years. Admittedly, many of these companies have only recently begun evolving formal strategies for obtaining applications software, particularly from sources outside the company.

In recent months, IBM has gone on some expeditions out in the independent software savanna. Last October, the company sponsored a three-day seminar for independent applications vendors, seeking packages for its 4331, 8100, System/38 and Series/1 systems [CW, Nov. 9]. That meeting dovetailed with an announcement earlier in the same month when IBM said its General Systems Division would consider possible nonexclusive marketing arrangements with independent software vendors.

NCR Corp. has a two-pronged approach to obtaining applications. In its selected target markets, the firm builds its own software. However, NCR also has about 350 software houses as members of its Software House Liaison program, according to Dennis Peck, assistant vice-president of the General Purpose System Division's product management.

The firm's in-house applications development effort centers around financial, retail and commercial/industrial/medical market segments. The company is currently building a universal nonstop financial system and recently came out with its Mission manufacturing package, Peck said.

Under its Software House Liaison program, NCR has developed a catalog of more than 600 applications. Some were designed for its target industries, but many others are for areas in which the company does not specialize.

In return for participation in the program, NCR holds a users's meeting for these vendors and allows them to acquire at a discount hardware for use as development systems, he explained.

At Burroughs Corp. in-house applications are developed at the firm's five software centers. Burroughs specializes primarily in financial, distribution, wholesale and medical systems, according to Ben L. Rouse, vice-president of the vendor's line of business marketing. About 750 employees are involved in this effort.

Moreover, the company has started acquiring packages from outside the firm on an exclusive basis. After these packages are acquired, the software is treated as a Burroughs product, with the firm supporting it. Burroughs has already acquired five or six packages in this

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Mail to: Hewlett-Packard, Attn: Tom Anderson, Dept. 03116,
974 East Arques Ave., Sunnyvale, CA 94086.
CW 1/4

Price U.S.A. list—subject to change without notice. 42104 HPT 60
Keyboard reproduced actual size (11" wide); CRT appears slightly smaller because of photographic perspective.

Shifting Gears

way, one of which is a job shop package, he noted.

However, when the firm introduces its small business machine during the second quarter of 1982, it will be qualifying program products for that system on a nonexclusive basis, Rouse disclosed.

In selling its smaller systems, applications software represents 25% to 30% of the price of the system, Rouse estimated.

Recently, Burroughs has started acquiring packages for independent system houses. To date, the firm has signed formal agreements with 30 firms that purchase hardware from Burroughs and develop applications for those systems.

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Like NCR and Burroughs, Sperry Univac also builds in-house packages for its special market segments — manufacturing, government, airlines, energy and distribution.

But increasingly the firm is looking to outside suppliers for specialized packages in new areas or for integration into its specialized markets, according to H. Glen Haney, vice-president of strategic planning and development. The company recently acquired a Baustein Geometric Solid Modeling package from Ikoss, a West German firm. This package will contribute to Univac's ability to provide computer-aided design and manufacturing (CAD/CAM) capability to its manufacturing package.

Univac has also acquired seismic and geological exploration applications from Digitech Data Industries, Inc. in Canada, he noted.

However, the major thrust of outside software acquisition is aimed at applications for the firm's minicomputer systems. Two years ago, the firm established an applications network, which operates through its minicomputer operation. This program seeks out appropriate programs from independent vendors who are willing to convert their programs to Univac systems. "These vendors often have fantastic ideas, but have serious cash-flow problems," Haney noted.

Univac is stepping up the pace of procuring software from these sources.

Control Data Corp. has recently taken a new tack towards applications. CDC's approach is to take a collection of individual applications, put them together and offer them as an "integrated applications system," Richard Rickenbach, vice-president of industry marketing, explained.

Last November, the firm introduced its first integrated package called Icem, which combines structural analysis, CAD and data base management applications. The system is offered both through the company's Data Services Department and through its Cybernet service bureau.

In putting together these integrated systems, CDC acquires packages from outside the firm on a royalty basis.

Like other mainframers, CDC has targeted several industries for which it develops applications in-house. These are manufacturing, which includes mechanical and electrical CAD/CAM applications. To manage applications development, the firm has instituted technology centers for each industry specialty, bringing together corporatewide expertise to decide whether a particular application should be developed in-house or acquired through a third party, Rickenbach noted.

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Compatibility: IBM 327X plug compatible; Bisynchronous; SNA/SDLC (2078/2087).

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The 2087 Matrix Printer also features SNA/SDLC protocol compatibility in addition to bisynchronous operation. It is both fast and quiet. A microprocessor-controlled print mechanism delivers high quality printouts at speeds up to 50% faster than the IBM equivalent. A bidirectional matrix print head seeks the shortest path to the next line, backwards and forwards, maximizing throughput. Acoustical engineering reduces noise levels, while a membrane switch panel, controls and LED indicators, all located on the front panel, provide the operator with local control and printer status.

The 2076 Remote Cluster Controller is a lightweight 30-pound package that accommodates up to eight printers and/or terminals in a bisynchronous environment. It measures a streamlined 6.5" high x 14" wide x 26" deep. While the 2076 can be located as far away as 4920 feet from its attachments, its dimensions allow for convenient placement just about anywhere, singly or stacked. Standard power-on, off-line and on-line diagnostics contribute to increased uptime.

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Divvying Up the Telecommunications Market

The Great Debate

By Phil Hirsch
CW Washington Bureau

It is, perhaps, slightly ironic that Western Union, rather than AT&T, was a major cause of the First Computer Inquiry.

Today, the telegraph company is busy establishing a foothold in the international communications market; meanwhile, the telephone company has become the major communications carrier involved in the great debate over how to divvy up the burgeoning "computer communications" market.

Back in November 1966, though, Western Electric was establishing "computer centers not only for its public message and circuit-switching functions, but eventually to provide . . . a variety of data processing, storage and retrieval services for the public," as the Federal Communications Commission (FCC) explained in its notice of the First Computer Inquiry. "The Bell system," the commission added, "has not yet indicated a plan to provide a similar information service . . . However, it is implementing a program to convert all central offices from electromechanical switching systems to electronic switching."

The commission thought that Western Union's plan to establish computer centers across the nation was one part of a basic change in the telecommunications industry that made reconsideration of the existing rules necessary. The other part involved "nonregulated entities" who were poaching on the carriers' traditional preserve.

"Banks, aircraft manufacturers, universities and other types of institutions" were cited specifically in the FCC notice. Following the example set by MIT, these companies were installing time-sharing systems, the FCC explained. In many cases, the system contained more than enough capacity to meet the owner's needs and the excess was being sold to the public.

"Economies of scale may well lead to larger and larger machines" with a consequent increase in the number of organizations selling commercial time-sharing services.

One problem created by these developments was whether to regulate the unregulated suppliers, since they were engaging in communications, an activity that "heretofore has been . . . limited to the communications common carriers." The other problem was focused on carrier provision of such services.

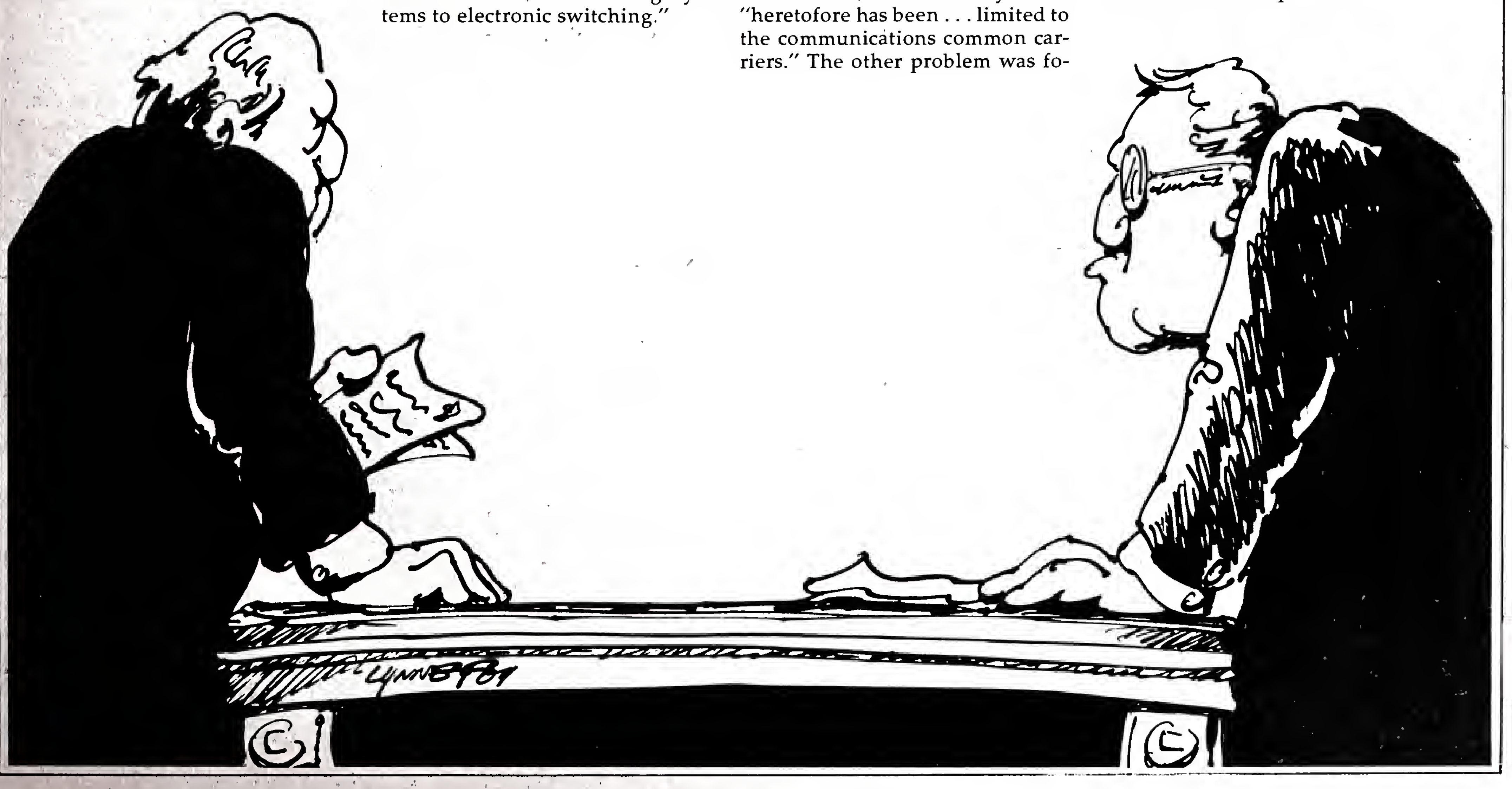
As the commission pointed out, the carriers "are, or will be in many instances, competitive with services sold by computer manufacturers and service bureau firms. At the same time, such firms will be dependent upon common carriers for reasonably priced communication facilities and services." Thus, the carriers would be in a position to compete unfairly.

Five years later, in 1971, the FCC resolved these conundrums by subdividing the world of computerized communications into three domains: data processing, message switching and hybrid services.

DP would continue to be offered by noncarriers, free of regulation. All carriers, except for AT&T, could also offer DP, provided they did so through separate subsidiaries.

Message switching, which the commission defined as the "computer-controlled transmission of messages between two or more points via communications facili-

Phil Hirsch is senior editor of communications at Computerworld.



ties wherein the content of the message remains unaltered" — could be offered only by the carriers.

The treatment of hybrid services combining DP and message switching would be determined by which was the predominant element.

The First Computer Inquiry decision finally became effective in 1973, after a number of court appeals and requests for commission reconsideration were disposed.

What shot it down and set the stage for the Second Computer Inquiry was AT&T's introduction of the Dataspeed 40/4 terminal — or more precisely, the commission's determination in December 1976, that the Dataspeed 40/4 was a communications — rather than a DP — device.

Using figures published by AT&T, the Justice Department pointed out in 1977 that total revenues of U.S. companies from a number of sectors of the electronic data processing market roughly quadrupled from 1967 to 1976. By comparison, domestic telephone company operating revenues over the period 1965 to 1975 approximately trebled.

The Justice Department went on to point out that because of the growth of distributed processing, AT&T's percentage share of the user's overall data communications dollar was decreasing. Essentially, this was because dumb terminals such as teletypewriters — long supplied by AT&T through Teletype Corp. and Western Electric — were being replaced by smart terminals which could not be supplied by AT&T because of the company's 1956 consent decree and the affirmation of that decree contained in the First Computer Inquiry decision.

The role of the Commission "has declined and is declining" for the same reason, Justice added. It pointed out, however, that while AT&T's percentage share of overall data communications business was dropping, the company's "total revenues as a result of data handling should significantly increase." Thus, it might not be necessary to change the rules established in the First Computer Inquiry.

The commission, however, saw things differently.

The first indication was provided by the December 1976 Dataspeed 40/4 decision. It concluded "tentatively" that the new terminal was a communications rather than a DP device. Earlier, the

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chief of the FCC's common carrier, bureau, Walter Hinchman, who is today one of Bell's most trenchant critics, decided that the 40/4 was a DP device.

In reversing Hinchman, the commissioners pointed out that "the bureau chief's application of the [First] Computer Inquiry decision ... is based on the assumption that the Dataspeed 40/4 becomes a data processing device simply because it possesses some data processing capabilities and is intended and marketed solely for usage with a central computer. The computer to which the Dataspeed 40/4 is linked ... is neither provided by, nor under the control of, AT&T ... Therefore, under our rules as they currently exist, it would be inappropriate to attribute to the Dataspeed 40/4, as IBM would have us do, the data processing functions of the ... computer in determining the tariffability of the Dataspeed 40/4."

> *'The Second Computer Inquiry was launched a short time before the commission's ruling on the Dataspeed 40/4, but the initial issue — concerning the role of a central computer in providing communications and DP services — was quickly replaced by the more general question underlying the Dataspeed 40/4 inquiry: what computerized communications services should the carriers provide, regardless of whether the logic is installed in a central computer or in a remote terminal?'*

After lopping off the computer functions, the commission concluded that the service provided by the new terminal "is similar in kind, but not in degree to that provided by established communications devices." It added that "by incorporating additional data processing-type functions, a point is reached beyond, which a service patterned after the Dataspeed 40/4 offering would ... constitute data processing."

The Second Computer Inquiry was launched a short time before the commission's ruling on the Dataspeed 40/4, but the initial issue — concerning the role of a central computer in providing communications and DP services — was quickly replaced by the more general question underlying the Dataspeed 40/4 inquiry: what computerized communications services should the carriers provide, regardless of whether the logic is installed in a central computer or in a remote terminal?

Changes Cited

The commission answered that question in a series of decisions (May '79, April '80 and Dec. '80) which drastically restructured the relationship between AT&T, vendors of computerized services and terminal makers. These were the major changes:

- Communications services would be placed in two categories — "basic" and "enhanced." The former — consisting of transmission and switching — would continue to be offered only by communications carriers and only on a regulated basis. Enhanced services — transmission/switching plus computerized processes that act on the format, content, code or protocol of the subscriber's transmitted information — could be offered by noncarriers and carriers, including AT&T, on a deregulated basis. Bell, however, unlike the others, would have to offer its enhanced services through a separated subsidiary.
- Enhanced services would be subject to FCC regulation even though deregulated by the Second Computer Inquiry decision.
- New terminal equipment, usually referred to as customer-provided equipment (CPE) would be deregulated beginning March 1, 1982, but already installed ("embedded") units would remain regulated and tariffed pending the outcome of a further commission inquiry.
- A waiver procedure was established giving AT&T some hope of modifying the separate subsidiary requirement. If the company could show that offering a given enhanced service through a Bell operating company, rather than through the new subsidiary, was in the public in-

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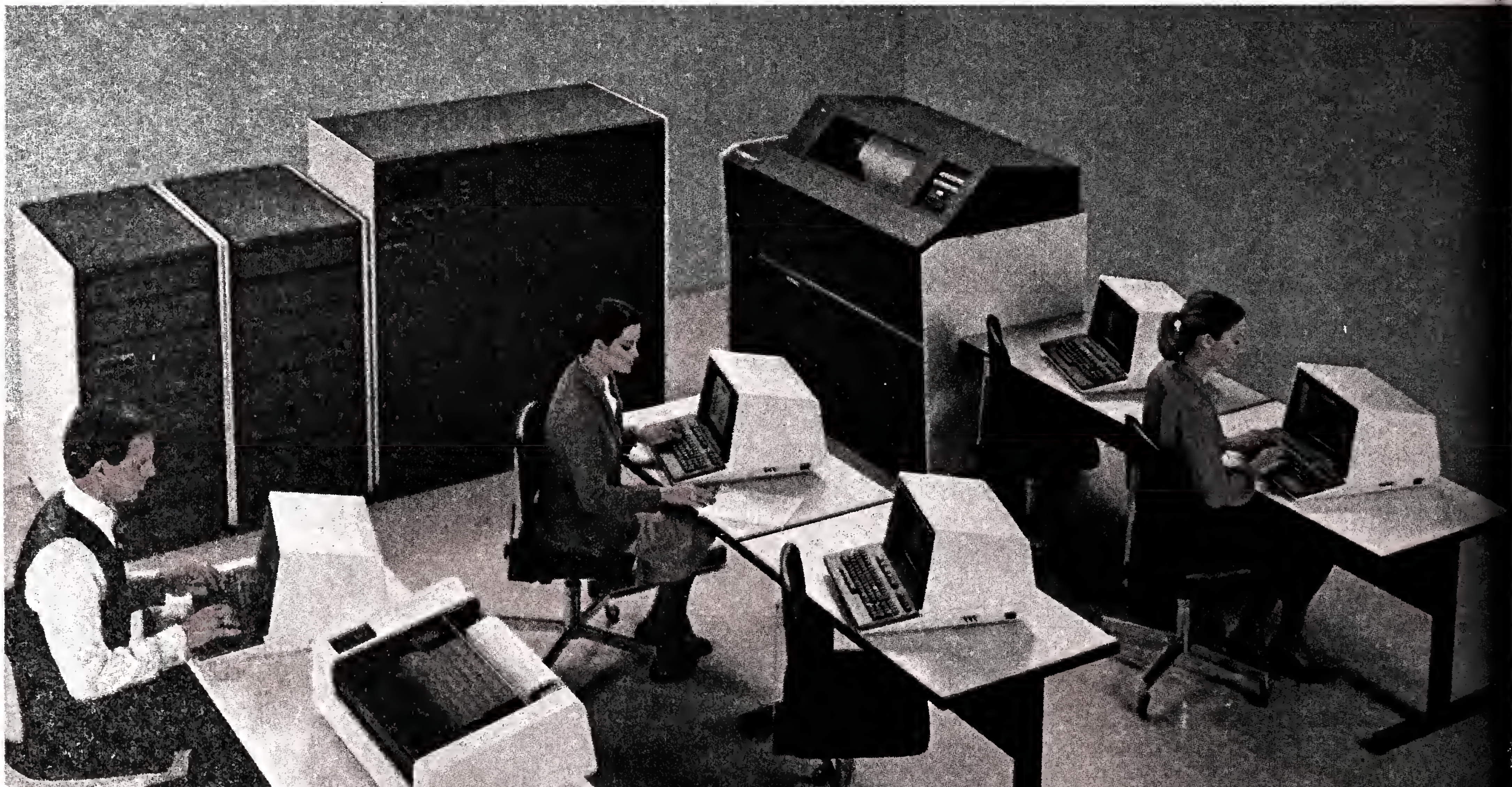

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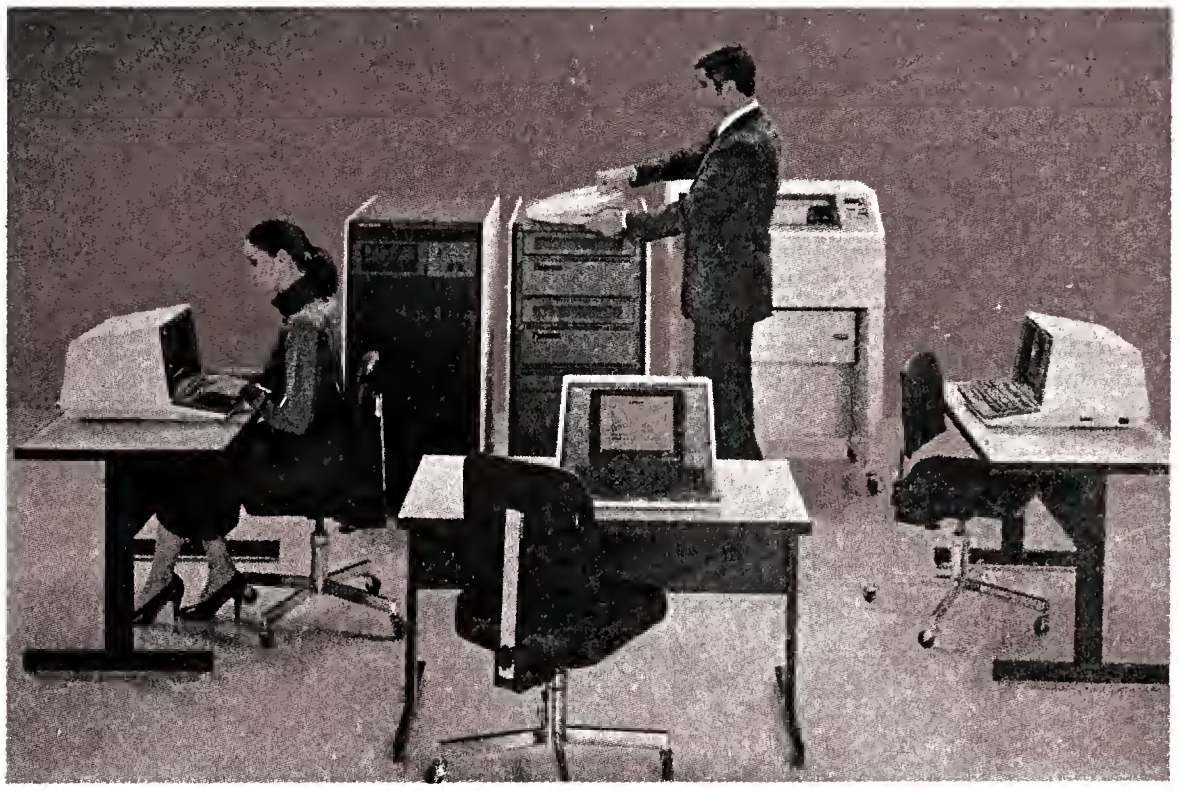

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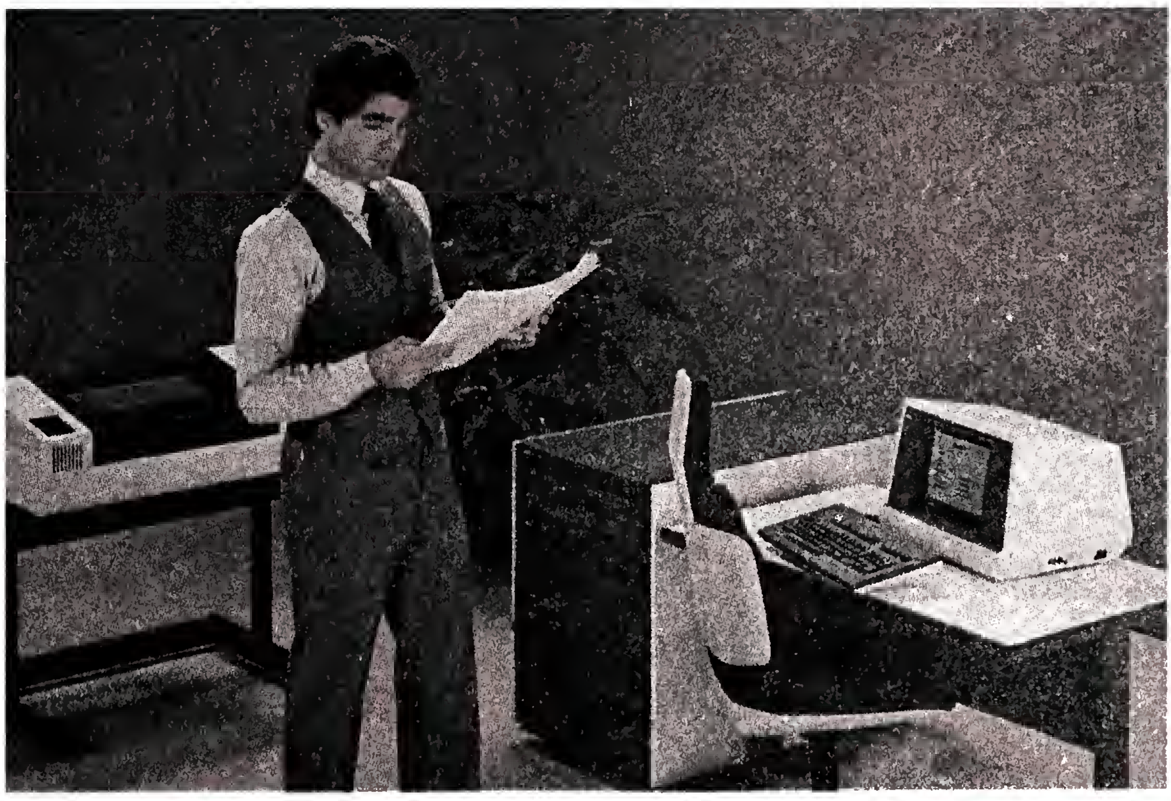
The I-9010 table-top 8-bit micro-oriented system offers advanced ergonomic design, multi-language support and communications capability. It is easy to operate and understand.



I-9020

terest, the commission would modify the restriction.

A key part of the decision involved the consent decree AT&T signed in 1956 with the Department of Justice. The decree essentially stated that AT&T, with certain exceptions, can offer only regulated communications services.

The FCC insisted that its decision did not conflict with this structure because enhanced services are "incidental to" communications and this is one of the exceptions specifically mentioned in the decress. Also, even though AT&T is allowed to offer enhanced services on a deregulated basis, this is not the same as unregulated, according to the commission. It pointed out that the services remain subject to FCC jurisdiction.

Major Developments

Since December 1980, when the final text of the Second Computer Inquiry decision was issued, numerous critics, from inside and outside the computer industry, have tried to change it. These are the major developments:

- The commission has rejected AT&T's request to offer Custom Calling II Services (CCS II), a proposed store/forward electronic message offering, through Bell operating companies instead of through the new separate subsidiary. It is generally agreed within the computer industry that if this decision had gone the other way, the "bright line" that the Second Computer Inquiry decision draws between basic and enhanced services would have been erased, thereby eviscerating the commission's new policy.
- The deadline for deregulating newly installed CPE has been changed from March 1, 1982 to Jan. 1, 1983, but already installed CPE will remain regulated until the commission resolves a number of related questions. One of these is how much the separate subsidiary should pay to the operating companies for their installed terminal base.

Critical Price

AT&T's opponents say that this price is critical because it will test whether the commission means what it has said throughout much of the computer inquiry about the need to prevent AT&T from surreptitiously cross-subsidizing deregulated services with revenues derived from the regulated side of the business.

- The federal district court in Newark, N.J., which is responsible for interpreting AT&T's 1956 Consent Decree, has endorsed the FCC's position that no conflict exists between the decree and the Second Computer Inquiry decision. That ruling has been taken to the federal appeals court in Philadelphia by the Department of Justice, the Computer & Communications Industry Association (CCIA) and others.
- Several additional modification efforts are pending. CCIA, for example, is at the head of a group seeking review of the whole decision in the U.S. Court of Appeals for the District of Columbia. And the Independent Data Communications Manufacturers Association (IDCMA), chief spokesman for the nation's modem manufacturers, along with CCIA and the North American Telephone Association (representing indpendent private branch exchange (PBX) and telephone equipment manufacturers) has asked the FCC to modify the decision's separation provisions.

As currently drafted, the decision states that marketing of enhanced services must be transferred to the new subsidiary and totally separated from the marketing of regulated services. But other activities, such as manufacturing and research and development (R&D), can be performed jointly, subject to specified limitations.

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The three trade groups want these latter activities separated as well. Their basic goal is to draw the "bright line" down through the Western Electric and Bell Labs organization charts so that manufacturing/R&D performed for the separate subsidiary and for the regulated side of the Bell system are totally decoupled. The FCC has deferred this request until it completes an inquiry into the license contract arrangements under which the operating companies pay for services received from Bell Labs and Western Electric.

Another concern of the three trade groups is that the FCC has not prevented the exchange of inside information between the regulated and unregulated parts of the Bell system.

The Second Computer Inquiry decision requires AT&T to disclose information about network changes to its competitors at the same time it informs the new subsidiary. But critics maintain that this does not prevent such information from being exchanged surreptitiously before the change occurs.

A good example, they contend, is AT&T's recent decision to shift much of its private-line traffic from terrestrial to satellite circuits. This will require retiming many modems to accommodate the propagation delay inherent in satellite transmission. A number of modem makers insist that AT&T Long Lines, the network operator, has already supplied Western Electric with the technical information needed to modify Bell modems, but has refused to provide this information to competing manufacturers.

The FCC, however, has concluded that "the marketplace will provide the best check" against such abuses and aside from promising "appropriate action" if and when the abuses arise, has rejected the request for reconsideration.

This is probably not the last word on the subject of whether the separate subsidiary established by the decision is adequately separated.

Congress almost certainly will have something to say about the matter next year, when it considers legislation to rewrite the 1934 Communications Act. Meanwhile, the question of whether, and how, to reorganize the Bell system is a major issue in the government's antitrust case against AT&T, now being fought in front of Judge Harold Greene.

Another development that could prove to be more important than any other is the capitalization plan AT&T recently submitted to the FCC. Along with it came an announcement that AT&T's much discussed, much delayed Advanced Communications System (ACS) will be the subsidiary's initial offering.

"We would like to make [ACS] available as soon as possible," AT&T Vice-President James Billingsley told the commission. "While we are mindful of the . . . requirement that capitalization plans be submitted 180 days before a subsidiary may offer service, we respectfully request that the commission approve the capitalization plan [within] 120 days."

Given the eagerness of Bell's competitors to offer enhanced services, the phone company's desire to get its separate subsidiary established and operating is understandable. However, there may be an additional reason.

If the subsidiary can be put on the air before Congress enacts a new communications bill, Judge Greene decides the antitrust case and the Washington, D.C., Circuit Court of Appeals acts on pending petitions for review of the Second Computer decision, Bell could be in a much stronger position to fend off its critics in each forum.

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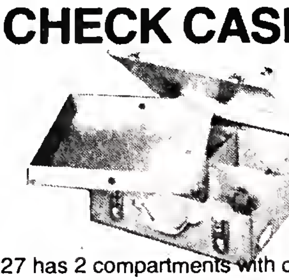

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The Jury is Still Out

Micronets

By Jeffry Beeler
CW West Coast Bureau

In large companies throughout the U.S., increasing numbers of low-cost personal processors or workstations are being installed and linked together to form microcomputer-based local networks that serve as alternatives to traditional in-house time-sharing.

This computing trend — one of the newest and possibly most important to hit the big business world — is vividly illustrated by what is happening at Storage Technology Corp. (STC) (see story on Page 59).

To some observers, the advent of microcomputer networks in the big business arena marks the opening of a new chapter in the ongoing saga of distributed processing.

Through the 1960s, corporate computing power remained highly centralized, with users able to gain access to automated services only through on-line dumb terminals.

During the 1970s, the delivery of automated services took a big step forward with the emergence of time-shared minicomputers, which probably more than any other single event formally inaugurated the distributed processing movement. Large-scale central processing facilities continued to play a vital role in corporate life, but with the arrival of time-shared minis, computing technology clearly gained a new channel of distribution and became available to a wider circle of end users than ever before.

Today, with the installation of microcomputer-based local networks, the natural evolution of distributed processing is continuing and is bringing the industry one step closer to its ultimate goal of making computing systems as commonplace and easy to use as telephones.

In no way has the emergence of microcomputer-based local networks rendered traditional large-scale processing facilities obsolete, according to Convergent Technologies, Inc. marketing vice-president Pauline Alker. For applications requiring very large amounts of computational power or storage capacity, no processing option yet devised — not even local networks built around microcomputers — can effectively take the place of central mainframes.

"There's no question that the corporate mainframe owns the data," according to Nestar Systems, Inc. President Dr. Harry Saal. "The central CPU is still the place where the corporate books are balanced and where the real order positions are kept." Saal sees microcomputer-based local networks as "analysis tools" and as "adjuncts" to a company's existing central computing department.

Contrary to widespread belief, office automation accounts for only a relatively small share of the total installed population of microcomputer-based local networks. "I don't mean to suggest that micros and local nets haven't already been used to do electronic mail and other advanced office automation functions," Saal said. "Those kinds of installations exist and we expect to see a lot more of them in the future. But the real explosion in office automation hasn't taken place yet and we don't see it coming until 1983 or possibly even 1984."

For the most part, microcomputer-based local networks have gravitated toward exactly the same kinds of business applications as traditional time-shared minicomputers — but with one important difference. Because of their comparatively low price tags, microcomputer networks have been able to establish a presence in corporate backwaters where automation has never before proved feasible, Saal said. In so doing, small systems have brought the benefits of real-time computing resources to an entirely new class of user.

Saal characterized the typical buyer of microcomputer-based local networks as a large, multimillion dollar corporation that likes to stay on the leading edge of technology and that has the financial wherewithal to experiment and take risks. Although most such companies have invested heavily in large-scale mainframes, many of their constituent user departments have remained unautomated because the expense of installing an on-line system has always proved prohibitive. But

Jeffry Beeler is a West Coast correspondent for Computerworld.

now, with the arrival of low-priced personal workstations, cost has ceased in many cases to be a major obstacle, the result being that many of these formerly all-manual operations are finally getting their first taste of real-time computing.

As STC case history suggests, the implementation of a microcomputer-based local network often takes place in three phases. The process typically begins with the installation of several personal workstations operating in the stand-alone mode. Later, all of the individual units are tied together to form a local network, and finally, a communications link is added between the entire collection and a company's central host mainframe.

Of course, not every personal computer model currently on the market boasts the ability to communicate with others of its kind. Microcomputer networking is still a relatively recent development and many hardware suppliers — most notably IBM — prefer to focus the bulk of their small-systems attention on products that operate individually rather than collectively. But among vendors and users alike, interest in networkable micros is rapidly growing. One possible reason is that, unlike their stand-alone counterparts, interconnected personal workstations enable their users to share peripherals and data bases and provide a number of other large-systems features not usually associated with processors at the very low end, Saal said.

Because microcomputer networking is still in its infancy, the exact extent of its current market penetration is difficult to gauge accurately. Few, if any, of the industry's systems census takers have officially recognized microcomputer networks as a distinct product classification. However, the majority of informed observers side with TRW-Fujitsu Co.'s vice-president of general systems marketing Jack Andersen, who described the current U.S. population of microcomputer-based local networks as "still quite small."

On the other hand, Saal countered, the emerging product species appears to be rapidly gaining converts and is experiencing a "phenomenal, hyper-exponential" growth rate reminiscent of the early days of personal computing. "There's so much room right now for the introduction of local microcomputer nets that, for most users, the main question is, not whether to buy from this vendor or that vendor, but whether to opt for a traditional solution like a time-shared minicomputer or an unorthodox alternative like personal workstations."

On the subject of microcomputer networking's long-term outlook, assessments vary widely. Some industry observers like Will Zachmann, a senior market researcher with International Data Corp., the Framingham, Mass.-based market research company, view the phenomenon as little more than one of the computing field's minor tributaries. "Maybe it's just my large-systems bias, but I don't foresee a major role for local-area networks consisting of microcomputers alone," he said. In the future, Zachmann predicted, personal computers and larger processors are much more likely to coexist in the

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'To some observers, the advent of microcomputer networks in the big business arena marks the opening of a new chapter in the ongoing saga of distributed processing.'

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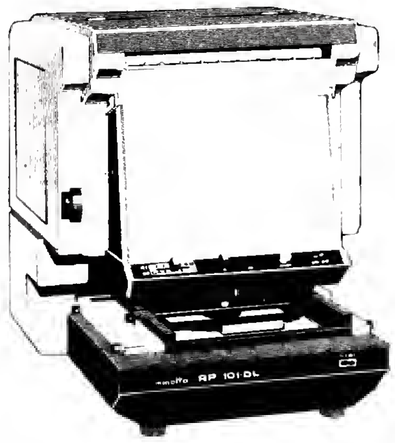

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same networks than to be electronically segregated.

Other observers, especially some of the vendors, view the future of microcomputers and local networks quite differently. At least a few suppliers, in fact, foresee the day when microcomputer-based local networks will prove as widespread and familiar as large-scale mainframes.

The emergence of microcomputer networks was brought about by many of the same technological and economic forces that prompted the rise of time-shared minicomputers, Saal explained. In most large companies, central computing departments have found themselves increasingly unable to keep pace with rapidly escalating user demand for data, management reports and automated services of almost every stripe.

To ease the resulting shortage of new systems and applications, users can typically choose from one of three in-house remedies. They can upgrade their company's existing central processing facility, install or upgrade a time-shared minicomputer system or opt for a solution built around microcomputers. In general, the microcomputer option costs less than its minicomputer counterpart, which in turn costs less than a large-scale CPU upgrade, Saal said. Little wonder then, that products at the very low end of the systems spectrum seem to be rapidly growing in popularity.

Although they often cost less to implement than larger computing alternatives, many microcomputer-based local networks rival the processing power of a typical time-shared minicomputer. Microcomputer networks also expand easily and provide better reliability and more immunity to response-time variations than many minicomputer models, Saal said.

Another important advantage of microcomputer-based local networks is that they put computing power right at the fingertips of the people who need it most — the nontechnical end users, TRW-Fujitsu's Andersen explained. The result is that users can often boost their on-the-job productivity, set their own priorities for application development and solve many of their own business-related problems straightaway. Without a local processing resource at their disposal, end users would probably be forced to place their computing fate entirely in the hands of their central, in-house management information systems departments, many of which are already straining under the burden of at least a two- or three-year backlog of unfinished applications.

One of the first microcomputer-based local networks to appear on the industry scene came from Nestar, which in June 1980 announced the ability to interconnect up to 65 Apple Computer, Inc. Model IIs around a common data base. Nestar's introduction probably marked the formal beginning of the microcomputer networking phenomenon. Not until 1981, however, did the budding concept finally begin to come into its own.

During the past year or so, the pace of new product announcements in the microcomputer networking field has steadily quickened — a development that has proved both beneficial and harmful. On the positive side, the wealth of recent introductions has greatly expanded the user community's range of potential solutions and, in the eyes of the big business world, has given personal computing an unprecedented respectability.

"Until recently, most DP managers or heads of end-user departments would have been extremely skeptical of using personal computers in a professional setting and would have rejected the products out of hand," Saal recalled. "But today, the attitudes inside large companies are quickly changing and micros are increasing-

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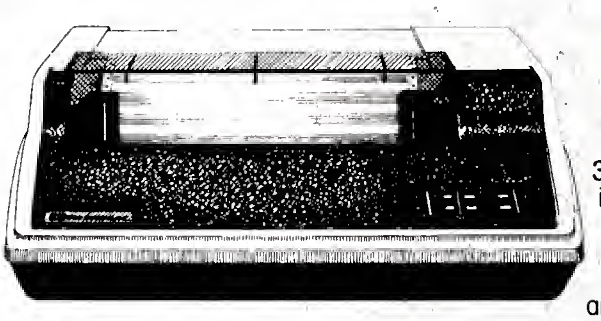

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ly gaining acceptance as viable, professional alternatives for extending an organization's DP capabilities."

The negative side of increased product diversity is that users of microcomputer-based local networks are now beginning to encounter many of the same selection and evaluation headaches that long ago became a way of life for their large-systems counterparts.

Each new arrival in the microcomputer product class further complicates an already bewildering welter of competing vendor options and compounds the difficulty of verifying performance claims.

"Offerings from different vendors vary widely in their sophistication, prices, communications capabilities and software features — all of which has led to widespread confusion and presented users with new challenges," Saal said.

During 1982, he added, this customer confusion will almost certainly continue. So, too, will the growing user tendency to create "networks of networks" by interconnecting formerly independent microcomputer clusters.

In addition, Saal predicted, vendors are likely to intensify their efforts during the coming year to equip existing personal workstations with true multiuser applications.

STC Finds Snafus

LOUISVILLE, Colo. — Until about seven months ago, Storage Technology Corp. (STC) here was running into at least two significant snafus tied to the development of its first IBM-compatible processor, which is due to be released within two or three years.

One problem was that the company lacked the in-house computing facilities to adequately test the proposed mainframe's semiconductor chips and circuit boards.

The other major hang-up involved STC's electronic beam controller, which was operating on-line with a Hewlett-Packard Co. (HP) Model 1000 processor. Designed for producing microcircuit masks, the electronic-beam controller was seriously overtaxing the processing power of the HP 1000, which in turn was plaguing its users with unacceptably slow response times.

To alleviate its production and testing problems, STC began last April to install about six Convergent Technologies, Inc.'s IWS/110 intelligent workstations and a roughly equal number of the company's the IWS/120.

Today, functioning as local front-end controllers for STC's semiconductor test equipment, the workstations are reportedly easing the HP 1000's processing burden and at the same time are helping their users to improve the quality of chip and board checking.

Within the next six months or so, STC plans to have all its workstations interconnected and at a still later date, the resulting local network is destined to be linked to the vendor's primary in-house mainframe.

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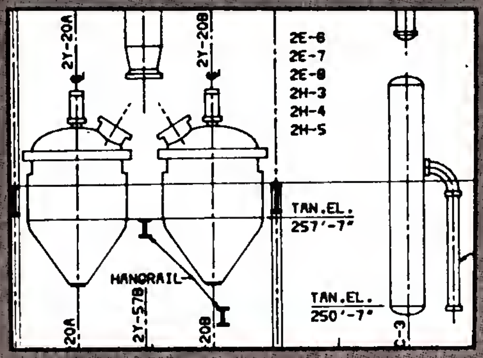

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Data as a Corporate Resource

Divide & Conquer

By Brad Schultz
CW New York Bureau

The "technological fix" to social problems is an approach as American as apple pie, researchers have noted. Here and there, computer technology has greatly improved the responsiveness of businesses to consumers and of government agencies to citizens.

But the organizational dynamics of systems implementations have often been unsatisfactory, especially in governments where applications have improved internal administration white actually deteriorating service to the public, one research group concluded this year [CW, March 30].

These experiences have led many users and consultants to advocate information resource management (IRM) — what some call management of data administration. Information systems managers should report to a top executive charged with ensuring that flows of data through systems truly benefit the organization, according to this perspective. In other words, data should be managed as a critical corporate asset in its own right.

According to Dr. Elizabeth Byrne Adams, a leading IRM advocate, application of information is a matter too important to be decided by technical experts primarily interested in "squeezing the last nanosecond out of their computers" [CW, April 13]. An organization's manager of IRM would work with the management information systems (MIS) director, end users and top management to maximize effectiveness of information, while the MIS director would concentrate on efficiency of information systems.

IRM is best-suited to large organizations, consultant Forest "Woody" Horton Jr. said this year. IRM would "take a monkey off the backs of DP managers," he told a conference, explaining that DP managers have "taken a bum rap" for systems that fail to provide the information required by end users.

A number of large companies have already adopted IRM or established the position of data administration manager or director. Milton Uscher, ITT's data administration manager, told one 1981 conference that his job was established because ITT top management decided data took too long to reach headquarters from the diversified manufacturer's hundreds of branch offices [CW, Oct. 19].

Uscher's department has reportedly implemented report generators and extended automation of data collection. At ITT, data does not leave the field before it is validated; branch offices are under orders to ensure that each element of data is collected only once, Uscher said. Data administration management has allowed branches to adjust better to organizational realignments of ITT's five major divisions, he added, and has improved data security.

According to Gary E. Mortenson, who once held Uscher's job at ITT and is now director of data administration for McGraw-Hill, Inc., data administration management is especially desirable after the fourth stage of an organization's experience with computerization. Mortenson subscribes to the six-stage model conceived by Dr. Richard Nolan before Nolan left the Harvard Business School faculty to found the consulting firm Nolan, Norton & Associates.

Based on studies of user experiences with computer systems, the Nolan model holds that companies generally pass through stages termed Initiation, Contagion,

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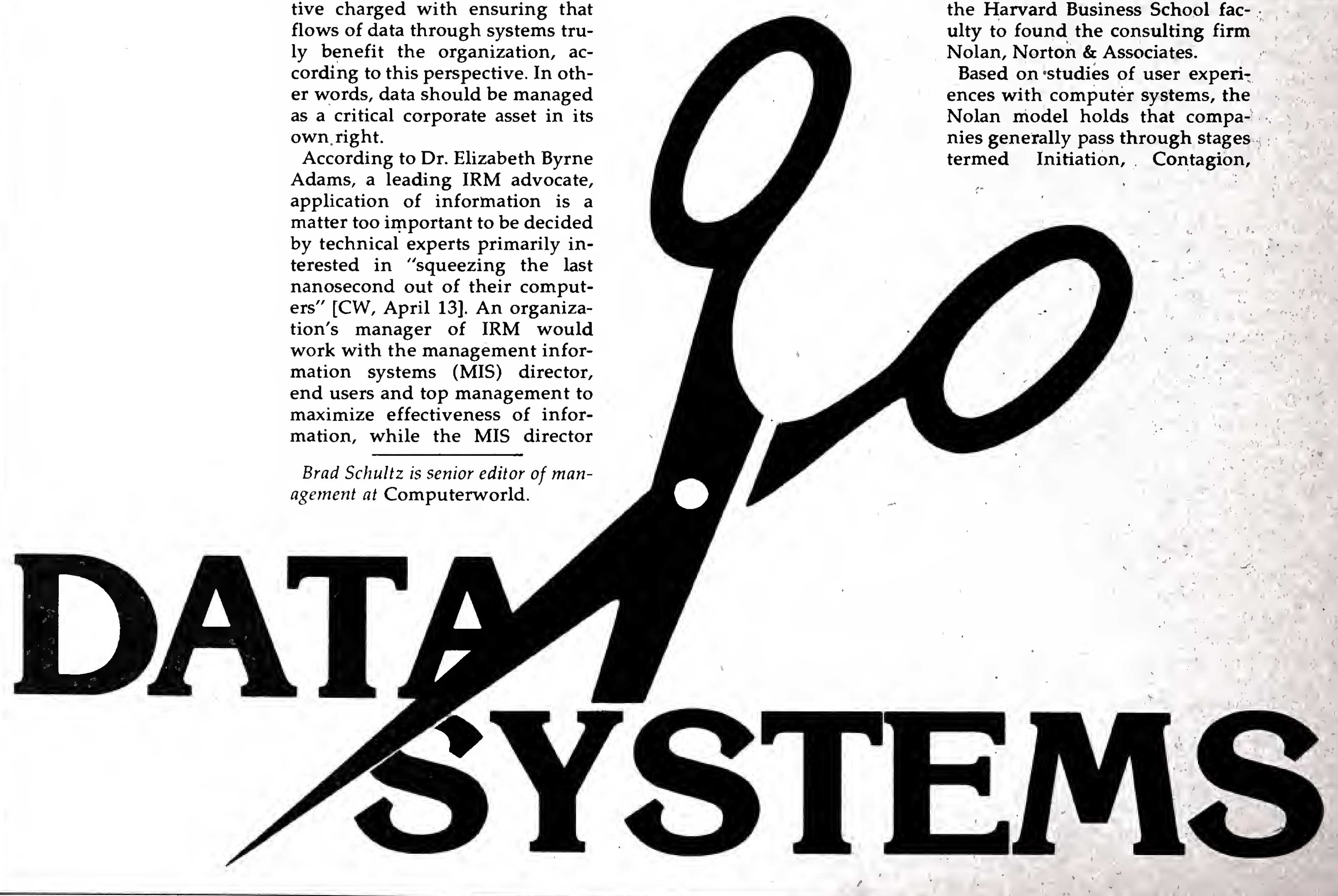
Brad Schultz is senior editor of management at Computerworld.



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Divide & Conquer

Control, Integration, Data Administration and Maturity, Mortenson explained this year. These stages represent distinct organizational structures for management of systems and suggest top management's fluctuating enthusiasm for implementations.

> *'Based on studies of user experiences with computer systems, the Nolan model holds that companies generally pass through stages termed Initiation, Contagion, Control, Integration, Data Administration and Maturity, Mortenson explained this year. These stages represent distinct organizational structures for management of systems and suggest top management's fluctuating enthusiasm for implementations.'*

During the Initiation stage, DP expenditures rise from zero dollars to a tiny fraction of spending in subsequent stages. For many IBM-based user organizations, the Initiation stage covers their experiences with IBM 1401 and 70 series computers prior to availability of the System 360 mainframe family, Mortenson said.

The company first installs systems and organizes a small technical staff to support them in this stage. Typical applications include payroll, accounting, plant scheduling, order processing and distribution, Mortenson noted. Some years later, the company enters the second stage in the Nolan model: Contagion.

This stage arises when middle management begins to develop systems for management control. Tactical systems such as order point planning, advertising sales promotion, budgeting and inventory planning "tend to spread like wildfire as each manager tries to outdo his colleagues," Mortenson observed.

Contagion typically corresponds to the time many companies had IBM 360 mainframes.

"There is great competition for DP services during this period, and DP management needs to chart a clever and politically sensitive course through this phase," he said. "Because many DP managers came up through systems and programming ranks and possessed little political savvy, there has been considerable redeployment of management during this phase."

DP expenditures accelerate during Contagion, moving an alarmed top management to ask "Why are expenditures so high and growing? Who is using these services? How do I know DP is productive vis-a-vis other companies?"

As a result, top management pushes the company into its third stage of computerization: Control. During the third stage, the rate of increase in DP expenditures drops. Many IBM-based companies are still in the Control stage, Mortenson pointed out, and typically run IBM 370 mainframes.

During the Control stage, DP and top management may recognize that duplicate systems were developed for several user departments, he said, and that similar data is independently employed by different user departments. "It is then that the concept of shared data finally gets some play, and before long, users and systems people alike are looking at the applications portfolio as an integrated support system."

That brings on Integration, the fourth stage in Nolan's model. Many leading edge companies — with IBM 30 series and 4300 computer systems — are now in this stage, Mortenson declared.

"It is important to note that top management can easily understand the integration concept," Mortenson remarked, "unlike some other [DP] topics relying heavily on systems theory. The [chief executive officer] is, after all, chief integrator, integrating data from his top lieutenants all the time in the decision-making process. Furthermore, he is often insistent that his functions use a common information base."

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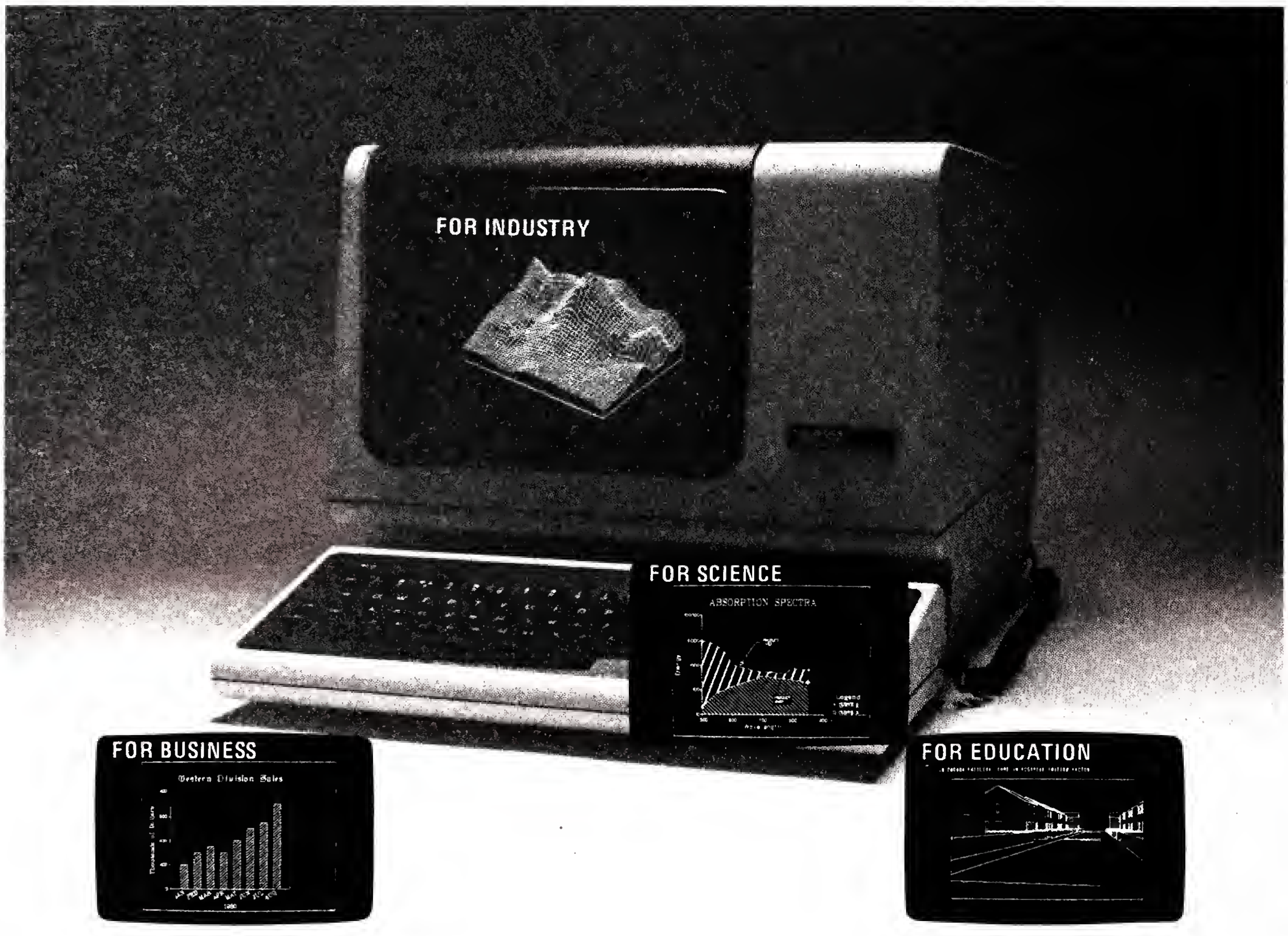

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must occur, Mortenson maintained. DP and top management "have generally focused upon the technologies during [Initiation, Contagion, Control and Integration]. Only in [Integration] has there been any inkling as to the importance of the data itself.

"Even then," Mortenson continued, "[DP] addressed the problem from a technological perspective [through] implementation of a [data base management system] and developing a supporting technical staff, called [data base administration]."

According to the McGraw-Hill executive, an information glut usually develops by the end of the fourth stage. Top management sees the glut as a dilemma.

On the one hand, end users are awash in computer-generated paper; on the other hand, end-user managers seek funding for more computerization including the implementation of personal computer equipment.

Moreover, data suppliers — during Integration — complain vigorously about demand to forward increasing quantities of data for consolidation, according to Mortenson.

Information Task Force

"At both ITT and McGraw-Hill, this has resulted in the formation of an information task force, whose charter is to examine the information resources and sources, with the idea of eliminating data redundancy and the unnecessary collection of data."

This is the point at which data administration appears especially opportune, Mortenson concluded. He quoted Nolan as asserting that no organization seems to have reached Maturity, the model's sixth stage. "Indeed, only a handful [have] reached stage five."

These 1981 views on IRM and data administration run counter to predictions of the late 1970s that DP managers were destined to become "information czars," running DP, telecommunications and word processing in the capacity of senior vice-presidents for MIS.

Peer Operation

At ITT, for example, Uscher operates as a peer of the person running the corporate Technical Services Division. Technical Services procures, develops, implements and supports information systems. The Data Administration Division oversees collection and distribution of data run through the systems.

While the post of data administration (or IRM) manager may be filled by MIS professionals, it calls for far more expertise than technical jobs usually cultivate. The job entails deep insight into the industry addressed by the company and sensitivity to the disparate goals and influence of end-users.

Management scientists and consultants said in 1981 that establishment of these functions may be the only way to institute ongoing controls over the morality of systems applications.

Technical specialists are not necessarily indifferent to the ethics surrounding the data they process; but the ethics may be far from clear to them.

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By Tim Scannell
CW Staff

If an automobile salesman tried to sell a car with two engines installed within the same chassis, he would probably be laughed off the showroom floor.

However, in the computer industry, the trend towards using duplicated machine parts to perform the same or different DP functions is not regarded as a laughing matter. In fact, it is being fanatically pursued by a number of vendors that hope to capture the hearts and business of users who want some sort of protection against system failure.

Redundant, or fail-safe, computing is nothing new. Users have long known that the only way to really guarantee total computer uptime with a minimum of delay is to have two complete computer systems. When one system breaks down, the other can be used as a backup to carry the company's DP load.

This type of a solution works well for large companies with extremely critical computer operations. Eastern Airlines, Inc., for example, has three computers to handle its extensive reservations system, with three more standing by in case something goes "bump" in the first systems' hardware or software. The airline uses such a system because a breakdown in its computerized reservations system could cost the firm more than $20,000 per minute in terms of lost ticket bookings.

However, most companies — even the large firms with widely distributed systems — do not have the budget or the DP chutzpah to completely duplicate an entire computer network.

A far less expensive way to clone a computer is to build redundant parts into the same processor box or to have two complete systems that function as one until a hardware or software mishap occurs.

In order to get some idea of how fast the fail-safe market is growing, one must examine why there is such a terrific need for computers that do not unexpectedly grind to a halt. The increasing complexity of computer hardware and software provides the primary thrust behind the popularity of redundancy today.

When computers were first introduced, their purpose was to improve upon manual accounting and administrative procedures — to decrease a company's dependency on relatively slow people skills. However, as these machines became more sophisticated, they also became more indispensable to a firm's operation.

However, as computers became more internally complex, repairs became increasingly difficult. And the ever increasing shortage of people qualified to fix these electronic mazes sent maintenance costs through the roof.

The obvious solution to the problem was to let the technology police itself until permanent repairs could be implemented.

The current leader in fail-safe computing is probably Tandem Computers, Inc. Tandem was founded in 1974 and has doubled its sales in every following year since its first redundant computer system was shipped in 1975. In fiscal 1981, the

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Tim Scannell is a senior editor for hardware at Computerworld.

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company claimed total revenues of about $208 million — a 91% increase over the previous year's total, Gerald Peterson, Tandem's director of marketing, stated. And since the market is reportedly growing faster than Tandem, the firm fully expects to reach the lofty $1 billion mark by 1985.

Tandem's Nonstop and Nonstop II computer systems are based on multiple independent processors that operate under the wing of a standard operating system. Almost every component of the Tandem systems is duplicated. That includes processors, controllers, data paths and even the cooling fans and power supply. When a particular component fails, the firm's Guardian operating system directs the work load to other resources and the processing continues.

> *'The rising popularity in fail-safe systems and the quest for system reliability has given birth to a number of companies that want a piece of the burgeoning computer market. Not surprisingly, Tandem has become the prime target for these new corporate missiles.'*

Between failures, all of the system parts — including the duplicated segments — work on the data load. There are no idle components, Peterson explained.

Apparently, Tandem's architectural philosophy is a popular one. At the end of fiscal year 1981, the company claimed about 460 customers, 75% of whom are Fortune 500-type corporations.

The rising popularity in fail-safe systems and the quest for system reliability has given birth to a number of companies that want a piece of the burgeoning computer market. Not surprisingly, Tandem has become the prime target for these new corporate missiles. To the financial victor will go the lucrative spoils offered by users in niches such as on-line transaction processing, Tandem's key audience.

Leading the pack of hungry competitors is Stratus Computer, Inc., a small, but aggressive firm founded in early 1980 by a group of former Data General Corp. executives. Late last year, the company introduced a 32-bit fault-tolerant minicomputer system that has a hardware-based redundant scheme as opposed to Tandem's mostly software-dependent architecture [CW, Nov. 9]. It also carries a considerably lower price tag than Tandem's systems, making it affordable to users with a smaller budget as well as opening a door to users who plan to expand their operations.

Other recent Tandem competitors include August Systems, Inc. of Salem, Ore., which unveiled its Can't Fail system that is actually three computers in one; and Dosc, Inc., a firm based in Albertson, N.Y., which debuted a fail-safe system that uses one or two "hot-spare" processors, a fully redundant data base, high-speed data buses, power supplies and printers.

Stratus as Case Study

Stratus is not pulling any punches in its campaign against Tandem. William Foster, the company's president, spent nearly a year studying Tandem and the redundant systems market before putting a business plan together. Foster did such a thorough

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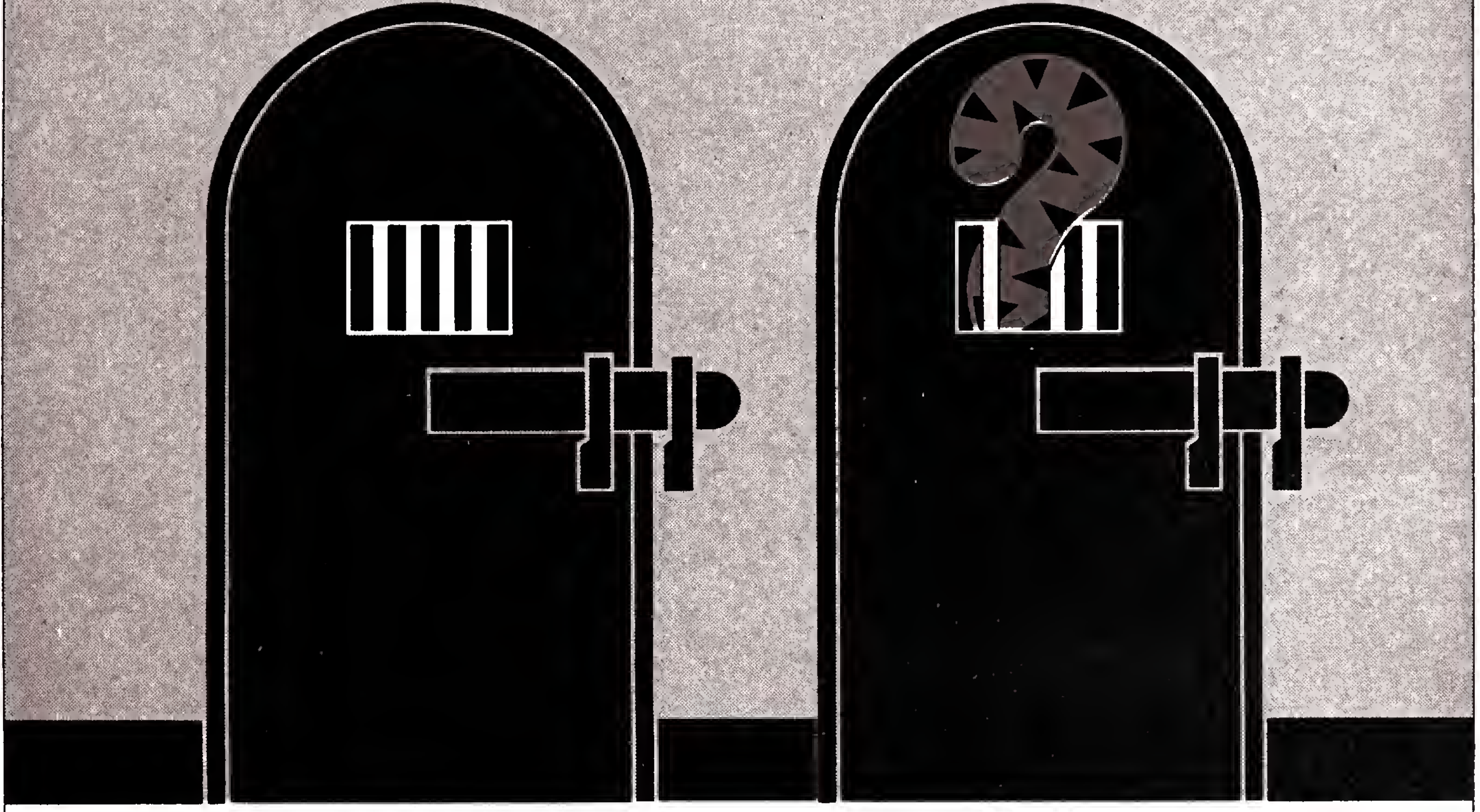

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corporate homework job that the Harvard University Business School is presently using Stratus as a case study of a well-planned start-up company, Nicholas J. Bologna, the firm's director of product marketing, said.

While Foster, a veteran of both DG and Hewlett-Packard Co., acknowledged the wide-open opportunities available in the redundant field, he did not agree with Tandem's approach to the problem. As a result, the Stratus/32 was designed with a predominantly hardware architecture as opposed to Tandem's mostly software-based redundancy.

"The way Tandem was doing it in 1974, when they designed their processor, was good then, but is not the best answer today," product manager Bologna pointed out. "Software is getting more and more expensive because it is people-dependent and hard to maintain."

By choosing the hardware route, Stratus was able to take advantage of the dropping costs and increasing sophistication of computer hardware, he noted.

However, Tandem will not be an easy target for Stratus and the assorted other firms that have cropped up in the past few months and will appear in the coming years. Since the company has been around for a long time, it has a solid reputation and a dedicated customer following. In fact, most users with installed Tandem systems do not intend to change vendor tracks in the near future, a recent survey showed.

Tandem also has a plethora of tested and reliable software available through third-party software houses and communications support for its products.

"They have the advantage of being a semimature company," Stratus' Bologna observed. "But the gap will narrow."

Tandem's product marketing manager, Gerald Peterson, insists that the firm is not particularly concerned about the increased traffic in the fail-safe river.

> *'Adding a little pepper to the thickening stew during the past year, a number of died-in-the-wool single-system manufacturers have gradually switched to fault-tolerant architectures by adding spare parts to their existing machines. And a number of very well-established vendors are seriously considering the reliability changeover.'*

"I'm not looking over my shoulder at the new competitors," Peterson said. "The driving force of the market is large, interactive applications, networks and distributed processing." This is an area where all of the current start-ups are unfamiliar and the users are wary of new technologies that could crimp the systems flow if they fail, he noted.

"To really be viable in that marketplace, there are a lot more things you have to do as a vendor besides building a box," he claimed. A company needs software integration that allows a network to play together, software support and a service organization in place, he said.

"Those are all very complex things to do from a business point of view," Peterson stated. "We may not be as big as IBM or DEC [Digital Equipment Corp.], but we do have a very good-size infrastructure in place that is capable of supporting large end-user customers."

And — like Stratus and other recent start-ups — Tandem can take advantage of such hardware benefits as advanced technology and plummeting prices, Peterson said.

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Redundant

Tandem's confidence in itself and its products has not prevented its competitors from taking perfectly legitimate potshots at the firm.

Stratus apparently has no qualms about boasting that it recently won over a customer that spent some time at one of Tandem's training seminars and subsequently decided to slip into the Stratus fold.

"The challenge that we have is to establish ourselves as a major vendor," Bologna said. "Otherwise, we're just a 'me too' kind of company."

Switching Architecturs

Adding a little pepper to the thickening stew during the past year, a number of died-in-the-wool single-system manufacturers have gradually switched to fault-tolerant architectures by adding spare parts to their existing machines. And a number of very well-established vendors are seriously considering the reliability changeover.

Sperry Univac and Prime Computer, Inc. already duplicate some of the circuitry and semiconductor chips in their high-end computers, making their systems less likely to be crippled by an internal failure. Companies like IBM and DEC are reportedly looking at the possibilities of adding redundant parts to their present systems.

In fact, DEC hinted at its last annual meeting that it soon plans to introduce a redundant version of its 32-bit VAX machine, aimed at on-line transaction processing environments. Last month, at its Decus users meeting, the firm moved further in this direction by introducing a triple symmetric multiprocessing (SMP) capability for its large-scale Decsystem-1090 mainframe [CW, Dec. 14]. Very generally, SMP is said to reconfigure the computer's operational processors in the event of a central processor failure and its software can reportedly skirt channel, controller or disk port malfunctions.

'As high-density semiconductor chips become cheaper, more refined and more available, it soon will not be extraordinary to install multiple processors in every computer system as standard equipment.'

However, entry of these computer giants into the fail-safe forest could cause negative ripples throughout the market and in their own traditional user bases. "If someone like DEC enters the fray, it can really cause some problems," said Aaron Goldberg, an industry analyst with International Data Corp. (IDC), a Framingham, Mass.-based market research company. "Someone with DEC's size and clout, in a smaller more limited market than the overall minicomputer market, can chew up the market share so that nobody is making enough dollars or revenue to get by."

Although IBM has been studying companies like Tandem with more than just a casual eye, Goldberg and other industry observers do not see the industry giant diving into redundancy or "niche marketing" a product in the near future.

"I would guess that any large company is working on some kind of multiprocessor redundant architecture," Tandem's Peterson commented. But, "that kind of architecture needs a new operating system, which means they would have to deal with issues of compatibility and resistance from their customer base. And that certainly makes life challenging for them."

Regardless of the inherent problems, Peterson does predict that one or more major computer manufactur-

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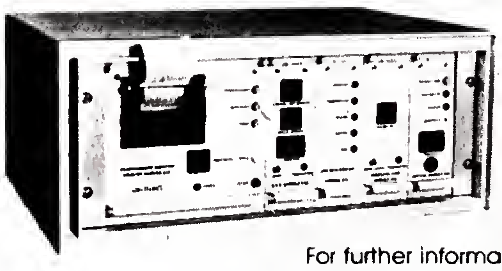

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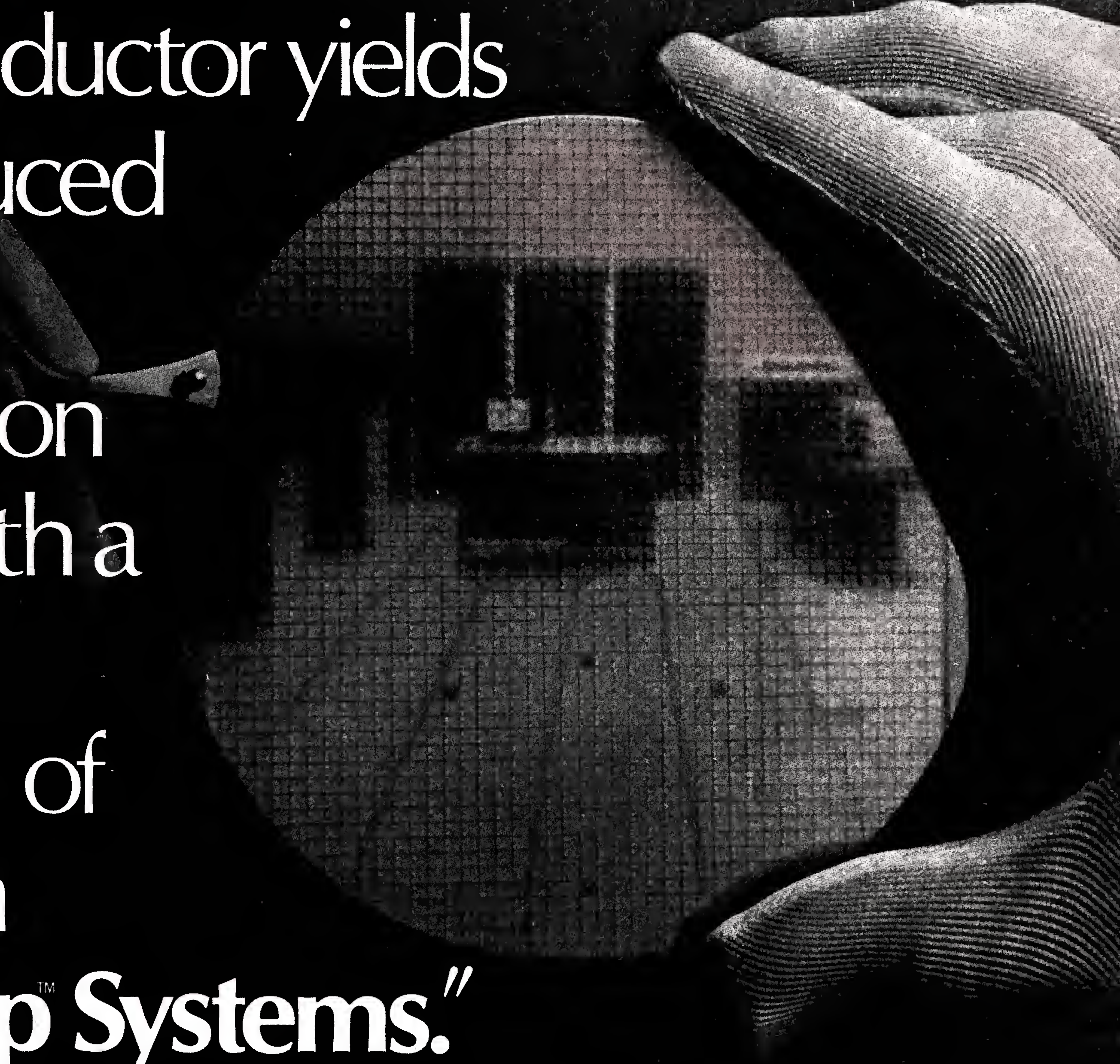

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ers, probably other than IBM, will introduce some form of fail-safe system within the next two or three years.

Since redundancy is based on the premise that two of anything are better than one, are there any technological breakthroughs on the fail-safe horizon? Or is the field limited to more companies jumping on the bandwagon that started rolling seven years ago with Tandem's founding?

From a technological standpoint, things seem fairly stable. However, the applications possibilities of fail-safe computing are only limited by each user's needs and imagination, industry observers said.

As high-density semiconductor chips become cheaper, more refined and more available, it soon will not be extraordinary to install multiple processors in every computer system as standard equipment.

Breakthroughs in Hardware

"If you drive down the cost of physical hardware, you can make typically redundant paths for less money," IDC analyst Goldberg stated. Not surprisingly, most redundancy breakthroughs that will occur happen in hardware rather than in software, he continued.

"You can build a double computer inside one box for less dollars, as opposed to doing it in software, which continually needs maintenance and revision, as well as improvement."

Stratus' Bologna believes that reliability through redundant parts will someday be an expected feature of every computer system and be taken for granted much like the high gasoline mileage expected in today's automobiles.

"In five years it will be demanded and all vendors will have to step up to it," Bologna observed.

Finally, a number of fail-safe people-in-the-know feel that office automation (OA) — which has been evolving at a rate paralleling that of fail-safe networks — will eventually cross paths with — and possibly become a part of — redundant systems.

"The real challenge in the '80s for vendors building nonstop machines is that they will have to deal with more than just a conventional data processing environment — which may be how the machine was justified in the first place," Tandem's product marketing manager said.

"As a corporation builds a network, it's going to dawn on them that they don't necessarily want to build five different networks to move other types of information. Somehow, all of that has to be integrated together."

Although hardware is involved in this conflict and possible merge, it is primarily a software challenge, Peterson said.

However, a marriage between redundant computing and OA could be a long time in coming, IDC's Goldberg maintained.

Unlike on-line transaction applications that demand reliability, "office automation does not live and die for it," Goldberg said.

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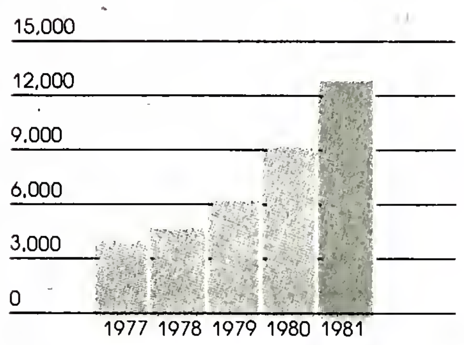

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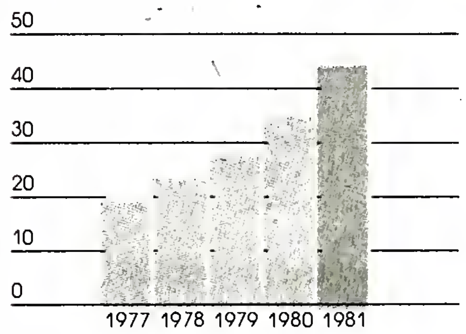

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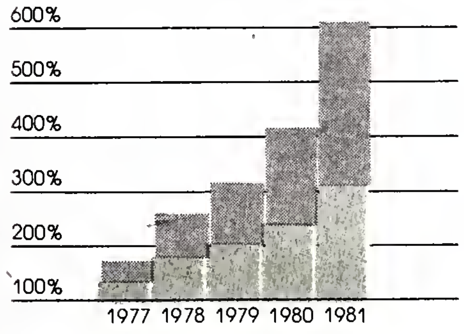

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Criminal Minds Keep Pace with Technology

Stop, Thief!

By Bob Johnson
CW New York Bureau

Computers are tangible, physical items and, in that respect, can be reasonably secured. However, the data processed by these machines is obviously intangible and myriad possibilities exist for the computer criminal to obtain, misuse or destroy information that could conceivably ruin an organization.

The electronic transfer of $10.2 million from a West Coast bank to a foreign account to buy stolen diamonds and the case of employees at a New York college who diverted more than $200,000 worth of computer time from the school's system to their own business are sensational examples of computer fraud. But they clearly illustrate the problems of computer security, asset protection and computer fraud prevention that the DP industry faces today.

Recent reports have told of corporate losses amounting to nearly $100 million across the country because of computer-related crime, with the average loss estimated at more than $600,000.

According to Total Assets Protection, Inc. (TAP), a Texas-based security firm, somewhere between 1,800 and 2,700 computer crimes were committed during 1981 at a cost that will run between $1.2 billion and $1.8 billion. TAP President J.C. Matlock also predicts that many firms will be out of business in the near future because they lack computer and asset protection and contingency planning.

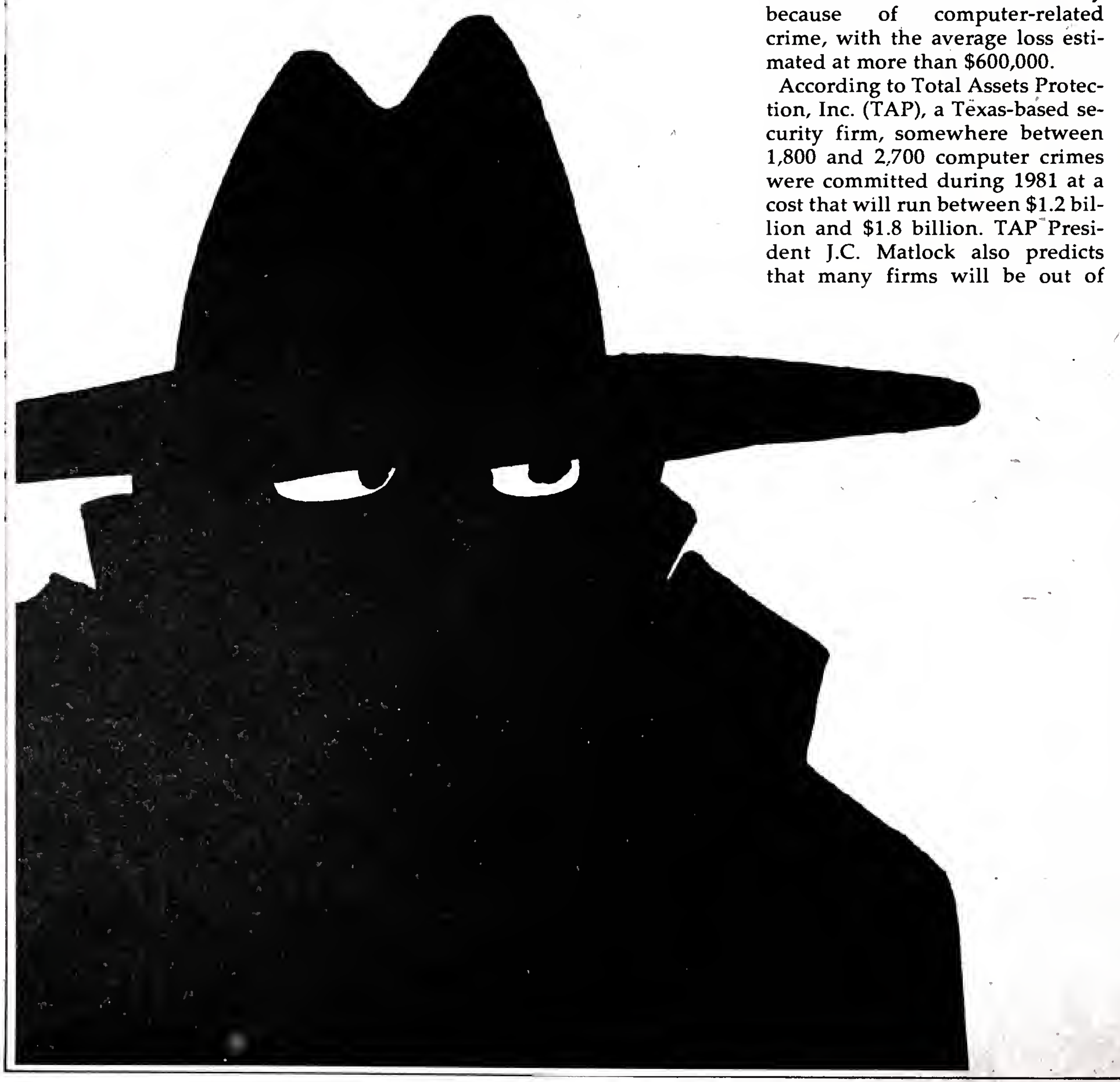
DP and security professionals agree that security problems exist and measures have been taken to rectify some of them during the last five years. Some companies implement physical security precautions such as computer room access control. Computer system monitoring and auditing, audit software controls, contingency plans, disaster recovery sites and personnel screening have also been put into effect in certain organizations. These precautions are on the right track, but as the technology progresses at a dizzying rate, new problems arise for the computer professional.

The speed of technological development and increasing sophistication of computer software compel industry observers to agree that firms which lack computer security basics would do well to catch up and implement measures to avoid disaster.

Although most professional DPers are at least aware of physical and internal security needs, some areas call for added attention in the very near future.

Securing data appears to be one of the most important areas of computer security currently confronting DP professionals. The move towards distributed data processing is causing public keyed encryption (PKE) to be a high-priority concern in this industry, Matlock noted. Communicating data over transmission lines necessitates sophisticated PKE, he explained.

While many experts maintain that PKE has a long way to go before it is widely accepted, Matlock said that "as DDP increases, the need for PKE will increase. Both hardware and software necessary to support PKE will become com-



Bob Johnson is a New York correspondent for Computerworld.

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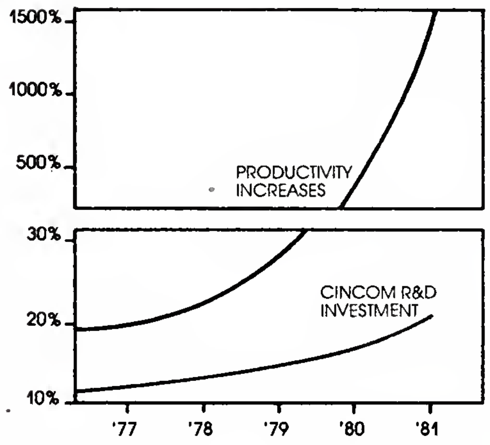

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mercially available." PKE differs from other encryption devices because it provides both a "public" key and a "private" key. The public key encrypts and the private key "decrypts," he explained, citing a telephone directory as an example. "The directory could have a listing of public key codes, but only the person who had the authorization to receive that particular message would know the private key code necessary to decrypt the message."

Authenticating a message is also a problem in telecommunications security, according to Matlock. "In the hard-copy world, proper authentication can be made by looking at a signature. PKE provides a mechanism whereby one can produce a nonforgeable signature that could authenticate transmission: This is extremely important when transmitting financial data or any other sensitive or proprietary data," he said.

Another segment of data communications that is often overlooked includes the physical lines over which data is transmitted. Belden Menkus, an independent security consultant, told of a major New York bank that transmits data over telephone lines that are laid over land fills. "There's always some sort of flooding around those cables. The data that could be lost there would be disastrous."

DPers should call attention to this

(Continued on Page 76)

Trends to Eye In '82

What are the trends in computer security for 1982? The following five industry experts offered these opinions:

- Donn B. Parker, senior management systems consultant, SRI International and author of "Crime By Computer" and "Computer Security Management": "I believe that computer security is maturing quite significantly. In that respect it is changing how we evaluate it. We no longer have to start from ground zero. In the near future we will be able to base our security decisions on generally accepted practices. We will be making decisions on the consensus of what others are doing.

"Up until now security has been in the hands of the technicians. But the real solutions lie in managerial control and in the control of people."

- John O'Mara, executive director, Computer Security Institute: "The fact that a number of people in DP now have the title of data security officer or specialist illustrates how computer security is becoming more accepted. This wasn't so four or five years ago and it is likely that this trend will continue."
- Toni Fish, manager of security and contingency planning for Shearson/American Express: "Computer security will probably be perceived as growing in the next few years, only because the computer will be the tool utilized to implement the same old schemes. Every attempt must be made not to overreact. Instead, emphasis must be placed on integral management controls and thorough systems design."
- Brandt R. Allen, professor at the Colgate Darden School of Business Administration, University of Virginia and member of the American Institute of Certified Public Accountants DP Fraud Review Task Force: "Nontraditional programming or fourth-generation user-oriented programming languages will cause major system rewrites and cause a strain on internal audit control functions. All of the computer auditing software in these situations will have to be reconsidered.

"By the end of this decade only 20% of this work will be done in Cobol, the rest will either be purchased software or done with new programming techniques. This will put a big burden on the control function for everyone dealing with DP auditing."

- Rolf Moulton, director of the computer security services unit of the New York City Department of Investigation: "The prevention of computer abuse is far better than ultimate victimization and prosecution. However, prosecution is necessary to protect the victim organization as well as future employers of the abuser."

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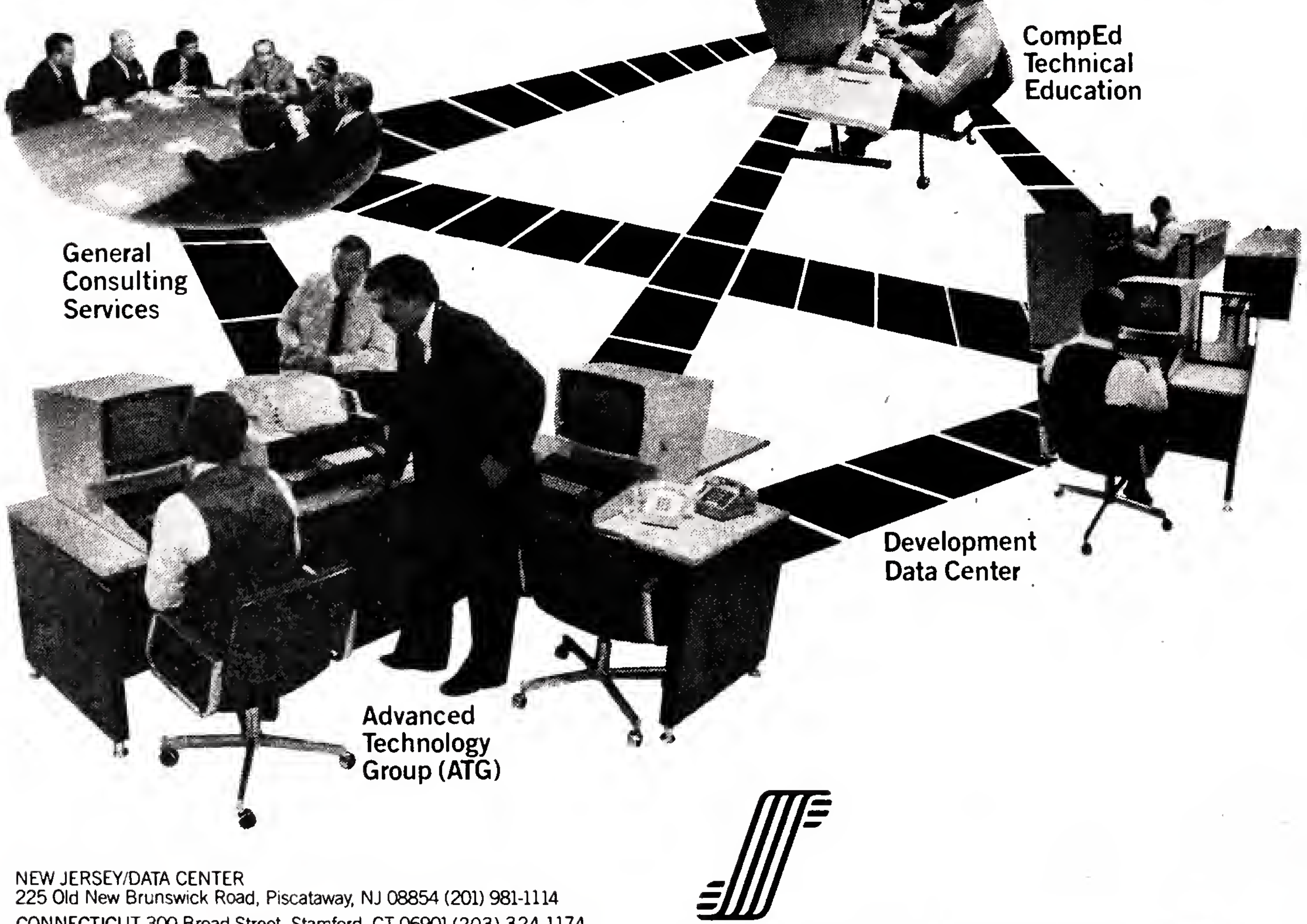
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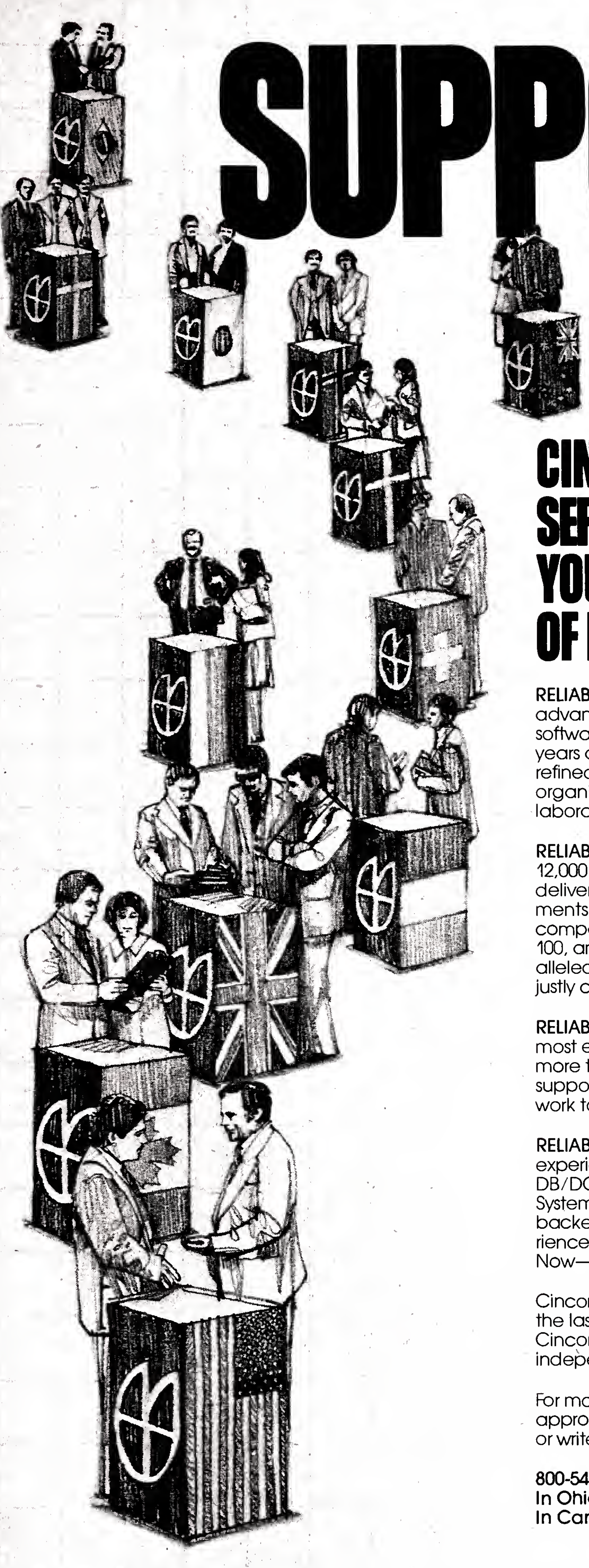

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Stop, Thief!

(Continued from Page 74)

sort of problem before it gets out of hand, Menkus said, because the technicians, rather than the public utilities, will be held responsible if something goes wrong.

Convincing management of the need for DP security is one of the biggest stumbling blocks to the security effort. At the eighth annual Computer Security Institute Conference and Exhibition held in New York recently, attendees and exhibitors agreed that the entire area is maturing and that management must be educated about its importance.

Wally McLaughlin, a technical consultant for CGA/Allen Software Group, said that the number of companies interested in computer security has multiplied by four or five times over the number exhibiting an interest a few years ago. Attributing this increase to the implementation of on-line systems, he stressed that management at companies without security should smarten up. "Most companies, especially banks and insurance companies, don't have computer security . . . probably because management has not been educated as to the need [for it]."

Catch Up Game

Another show attendee, Joe Truhan of United Jersey Banks, maintained that milestones have occurred in the field during the last three years that management "needs to know."

TAP's Matlock agreed, noting that management has been playing a "catch up game."

"Information security has not been given the highest priority due to the urgency to convert to more sophisticated systems needed to maintain business momentum. The DPer has been concentrating primarily on getting information to management on a timely and accurate basis, with less emphasis on incorporating security control mechanisms," he said.

Matlock stressed that intangible information is the keystone of corporate assets and that management must become aware of this fact. Proper planning of computer assets is required throughout the life cycle of those assets (see Figure 1). "Eighty percent of good information security is implemented through good management control mechanisms and 20% is the hardware, software [and so forth]," he said.

According to Rolf Moulton, director of the Computer Security Services Unit of the City of New York, management is the force that can actually prevent computer abuse.

"A computer and data security policy must be issued by top management to protect the assets of the organization, as well as to protect employees of the organization from unknowingly becoming involved in activities which may be criminal in some states," he said.

Although there may not be any earthshaking developments in computer security during 1982, industry experts agree that as information becomes a corporation's chief asset, securing that information will become vitally important.

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The Need for Behavioral Skills in MIS

Putting on a New Face

By Robert Batt
CW West Coast Bureau

> **"Our industry has placed a lot of emphasis on keeping pace with the advances in technology. To enable employee productivity to keep pace with technological improvements — and to be able to keep pace with the demand for new systems and system modification — equal concern needs to be placed on the motivational environment."**
>
> — *Motivating and Managing Computer Personnel*
> (By J. Daniel Couger
> And Robert A. Zawacki)

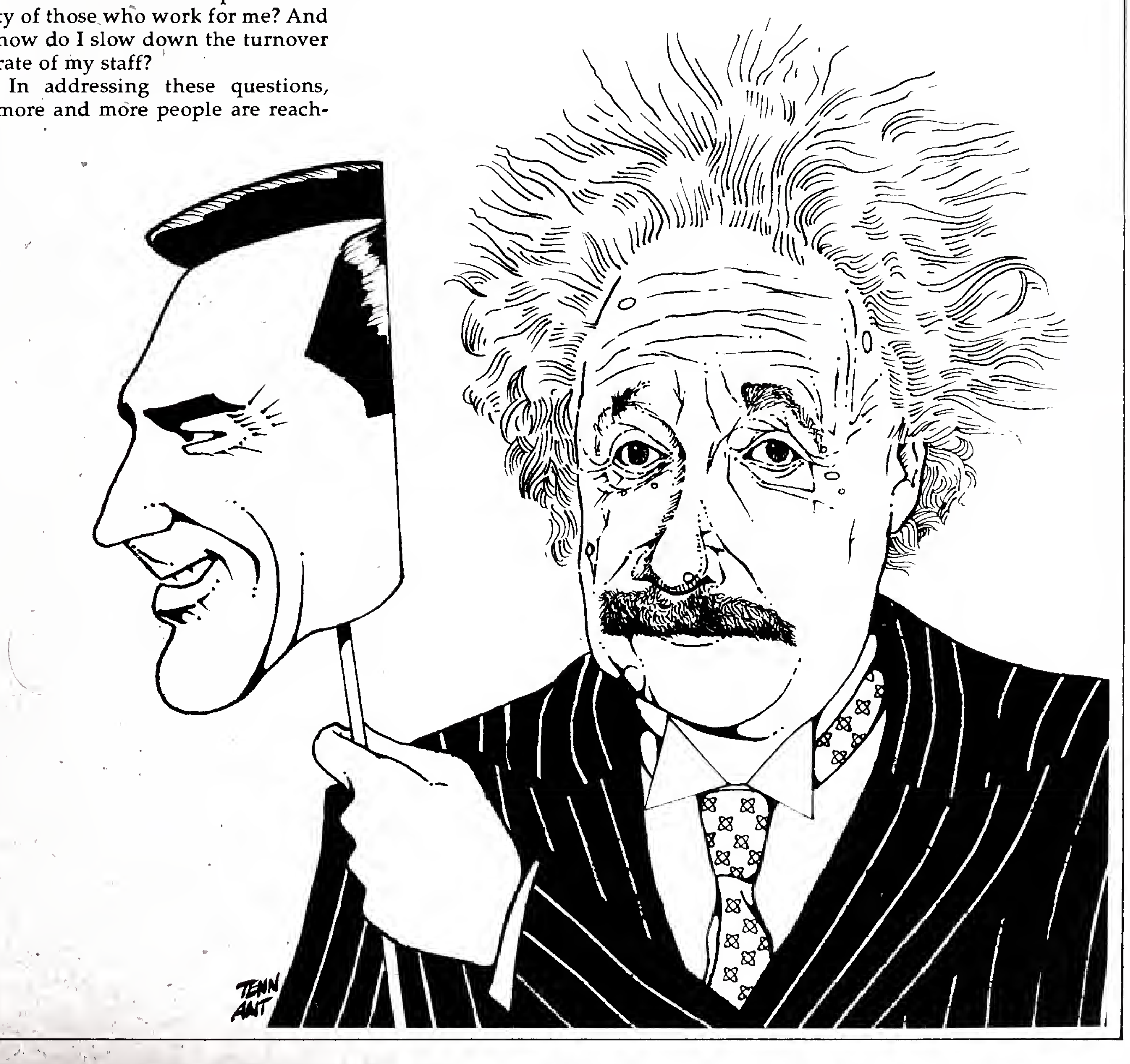
As we enter a new year and information systems managers begin to study strategic concerns for the next 12 months, two questions will be uppermost in many minds: How do I increase the productivity of those who work for me? And how do I slow down the turnover rate of my staff?

In addressing these questions, more and more people are reaching the conclusions quoted above. A recognition is beginning to emerge that the management of technological change requires more than simply a set of computing skills — it requires a strategic approach that lends itself as much to behavioral science as it does to hardware and software.

This should come as no great surprise. Technological innovation involves complex choices which are complicated further by the effect of those choices on individuals and work groups within an organization. And people are beginning to realize that responsibility for making productive choices depends in large part on the DP professional's level of motivation.

The management information systems (MIS) manager, programmer or systems analyst is operating in an environment that is not conducive to making productive choices. DP consultant David Holzman wrote: "The typical department manager usually does not understand his department's information flow. He doesn't realize its dependency upon what happens elsewhere in the organization. Or he fails to see the inconsistency between policy and management directives and how the work in his department is actually performed."

Holzman argued that often the DP professional is not strongly motivated to seek improvements in productivity or efficiency. If he is motivated by top management, he often fails to understand all the barriers to implementing change in the information process.



Robert Batt is West Coast Correspondent for Computerworld.

Putting on a New Face

As the power of information technology increases, its diffusion becomes more widespread, particularly as technologies converge — as with the office of the future.

"To reap the potential, users currently unaware of information flows must educate themselves to perceive the office as a series of identifiable processes," according to Holzman. "Furthermore, these processes can be evaluated and related to organizational missions and departmental needs leading to improvements in cost and productivity."

As part of this ongoing education, there is emerging what has become known as "a sociotechnical system approach" (STS) to implementing technological change within organizations. It is based on a systematic analysis of the technology and of the organization's accompanying patterns of human interaction.

Researchers have come to realize through the STS approach that the conventional ways of organizing work and designing jobs are not determined by the technology alone, but are the result of assumptions and decisions on the part of engineers, designers and managers. "In fact, the range of choices with respect to work arrangements, reporting relationships and the scope of decision-making in any particular job is much broader than has been ordinarily recognized," according to James Taylor of the Center for Quality of Working Life at the University of California at Los Angeles.

According to the STS approach, this breadth of choice calls for an increased breadth of skills to be acquired by the DP professional as he attempts to grapple with technological and organizational change.

Thus, most of the STS focus is on redesigning the work of MIS department personnel. Although such an approach includes areas such as job redesign, job enrichment and job enlargement, it goes beyond the narrow job issues to encompass the dynamics of organizational change and the structures needed within the MIS department to accommodate them.

New Demands

To go along with this approach, the DP professional must acquire skills beyond those he ordinarily picks up through his work. It calls not only for technical competence, but also for human interaction skills and the ability to see the whole picture.

"These skills call for far greater flexibility than is usually demanded of the DP pro, with an emphasis on the end product rather than one's own specialist niche," Taylor said.

In work at the University of Colorado, J. Daniel Couger and Robert A. Zawacki discovered two characteristics peculiar to the DP professional: the need for a highly challenging environment (called "high growth needs strength") and relatively little need to interact with other workers in the organization ("low social needs strength").

"These two things influence both [DPers'] internal motivation and the way they interact with users for whom they are designing systems," Couger said.

Much of the work that Couger and Zawacki conduct with MIS professionals is aimed at redressing this imbalance so that human interaction skills are more fully developed. The cost of not developing such skills, the researchers say, would be a reduction in opportunities for DP professionals.

"What's currently happening is that this guy with low social interaction needs eventually winds up becoming the DP manager. In this job he continues to be low in interaction . . . with his fellow managers in other departments," Couger explained. The result? "The DP manager is not viewed by other managers as part of the management team. What's happening is that more and more MIS managers are coming from outside the DP ranks within the big organizations."

Jobs Explored

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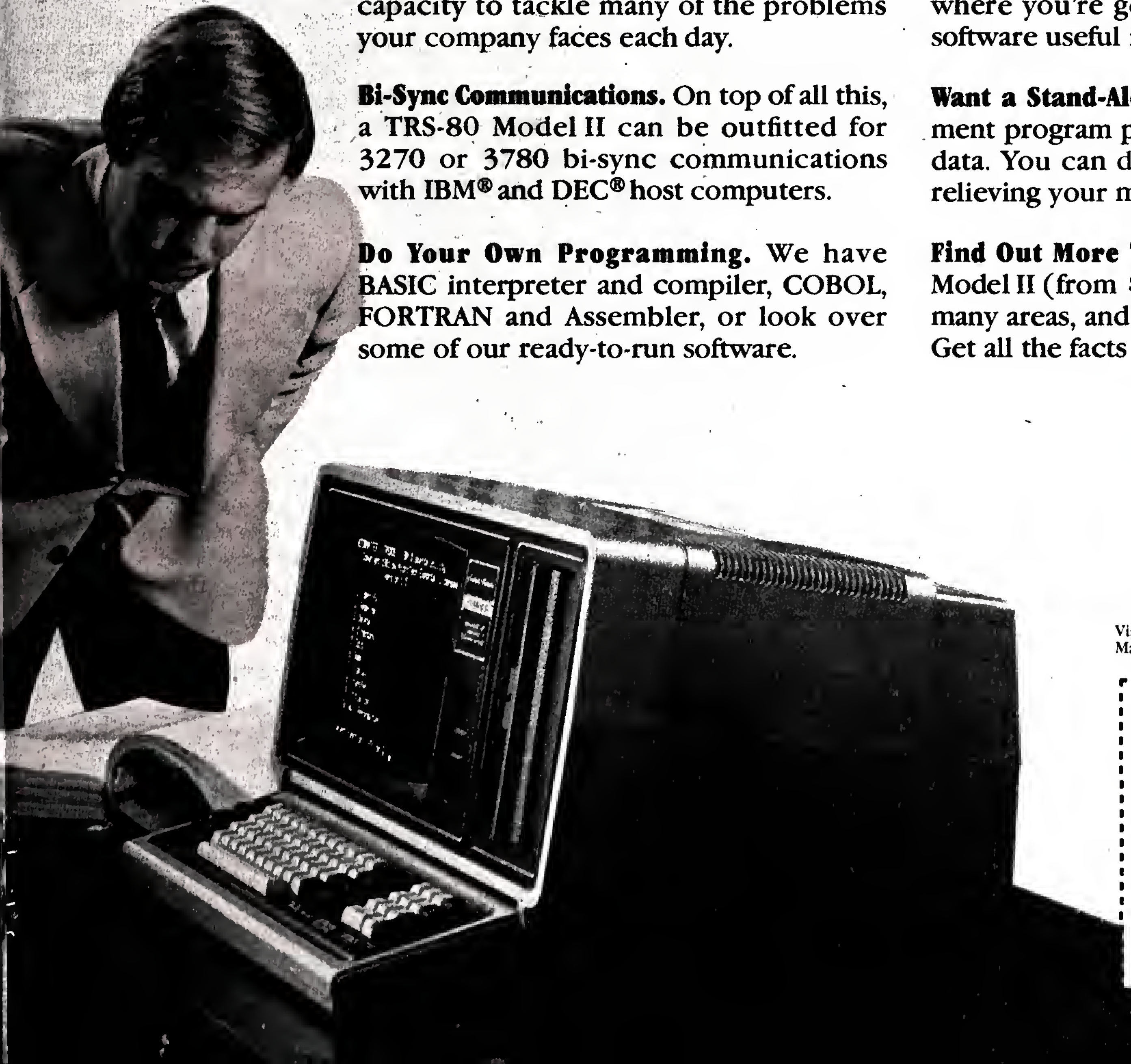

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some of the myths surrounding the DP professional — for example, that he is unduly resistant to change.

"Given the work we have done with MIS people, there is no doubt that they can adapt their behavior when their awareness is drawn to possible deficiencies," Zawacki said. "Because of their very high growth need, they are not as resistant to change as has been supposed, if by changing something they see it as a means to getting ahead."

Zawacki claimed that with more than 100 universities throughout the nation offering systems analysis courses that include behavioral techniques, resistance will be further reduced over time.

No Easy Task

However, not all practitioners share this optimistic view. The DP director of one Fortune 500 company in the Midwest maintained that implementing a sociotechnical approach was proving to be a major problem.

"The fact is that we have spent 25 years pounding the traditional approach into people, and so the DP professional now sees these developments as rather threatening," he said.

"It is clear that we cannot continue putting together systems in the traditional way, but the rate of acceptance of a change to a more behavioral approach has not been as fast as we would like. It is not a technical problem; it is a management problem — one of motivation."

In a recent speech to the Semiconductor Industry Conference in Phoenix, Manny Fernandez, chief executive officer of Zilog, Inc., argued that this problem of motivation stems directly from management policies, rather than from any inherent characteristics of the DP professional.

Contrasting the Japanese approach to DP personnel with its American counterpart, he said: "Key to the Japanese management philosophy is that human beings are a company's most important and profitable asset. This philosophy is backed up by tangible management policies.

Strong emphasis is placed on the continuous development of employee skills through cross-training on a variety of jobs. Thus, the employee becomes a generalist rather than a specialist.

"Although it's never stated outright, the American assumption about its work force is that people are unpredictable. Most companies subscribe to the theory of human nature that says, 'If we don't control people, somehow they will mess things up.' In other words, people are regarded as liabilities. The result has been an increasing disconnection between employees and products," Fernandez said.

The cost of such a disconnection has been enormous, according to critics. Holzman argued that by adopting the IBM approach of breaking down jobs and narrowing the skills base, natural interfacing with other people and areas of work has been

'Key to the Japanese management philosophy is that human beings are a company's most important and profitable asset. This philosophy is backed up by tangible management policies. Strong emphasis is placed on the continuous development of employee skills through cross-training on a variety of jobs. Thus, the employee becomes a generalist rather than a specialist.

'Although it's never stated outright, the American assumption about its work force is that people are unpredictable. Most companies subscribe to the theory of human nature that says, "If we don't control people, somehow they will mess things up." In other words, people are regarded as liabilities. The result has been an increasing disconnection between employees and products.'

thwarted.

"We thought education would solve the problem, but it hasn't," Holzman maintained. "What has happened is that the DP department has become isolated amongst the management structure. The pattern was set for all future DP jobs. There was no thought given to job redesign or job satisfaction. We've even passed on this experience to the end-user departments so that we have just been perpetuating the same job structure for 20 years and people haven't given thought to the fact that things could be better."

As a result, Holzman said, DP personnel have been poorly trained. There has been little switching of jobs compared with Japanese practice. Programmers are not turned into systems analysts.

Enormous Costs

"The cost of this approach has been enormous," Holzman said, pointing to the archaic and unimaginative use of computers within government as an example. "Because people are so poorly trained, they can't rewrite software without great difficulty and they are still simulating old hardware on new software because machine code is not being written."

The tragedy of such an approach is that it fails to really use the potential of information technology, he continued. Schools and medical and financial institutions were not able to utilize computers in a way that fully contributed to the economy and society.

STS proponents argue that to take advantage of the opportunities presented by emerging technology would involve a willingness to take risks. The old models, according to UCLA's Taylor, are not sufficient for managing rapid growth. It is a question not simply of modifying behavior, but of restructuring organizations.

"The focus with this new approach is on an organizational purpose that is much more highly defined than hitherto. It is organizing for success rather than organizing for control, and for this to happen, the DP pro has to be much more adaptive and flexible," Taylor said.

The need is not for management to give up control, he added, but for people to be permitted to take internal control.

Zilog Attempt

Zilog attempted this approach when it opened a new manufacturing plant in Nampa, Idaho, in 1979. The premise was that if people were given the knowledge and skill to understand the reasons for what they were doing, they would develop a commitment to doing their jobs well.

"Jobs must be made consistent with human requirements, fulfilling both the technical and social needs of the factory. The worker must have a sense of ownership in what he is doing," Fernandez said.

In accordance with this philosophy, a team concept was introduced, with each team being responsible for a tangible objective. Under this scheme, decisions are not decided at the top and handed down for implementation. Instead, team members take part in the decision-making process.

Boundary Management

The primary job of the manager is to provide the teams with enough information for them to meet attainable goals. How they meet them is left up to the team. The manager defines where the group's responsibilities begin and end — known as "boundary management." Using this approach, turnover at the Nampa plant has been 1.5% a year, compared with an average of 55% to 60% for similar plants in Silicon Valley, according to Fernandez.

Managing change at the boundaries should be the biggest task of DP management, according to behavioral theorists. Holzman explained: "Most of the errors in the processing of data come when the data crosses boundaries." He argued that the successful management of new technology would depend on the presence of three factors — necessary job skills, a management style based on trust and participation and organizational structure.

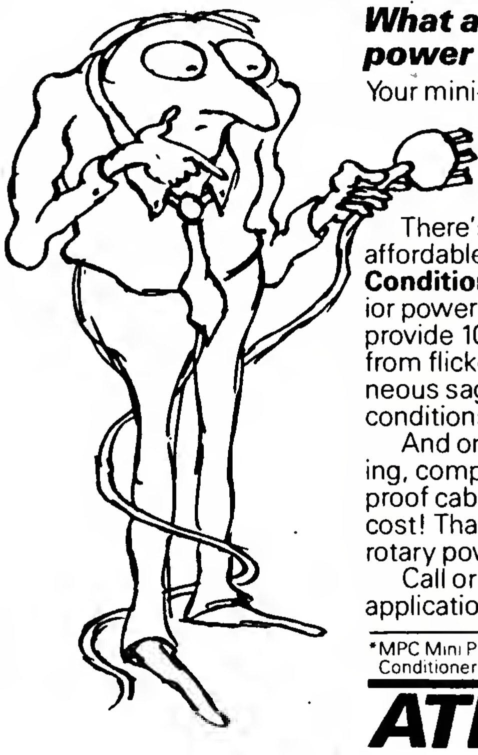
"Unless those three factors are present, you are not going to get improvements in productivity or effective boundary management. For this reason, I believe there will be many early failures in office automation because little thought is being given to the organizational requirements," he said.

However effectively new technology is implemented, it is becoming increasingly clear that productivity improvements within the MIS department will not rest solely on better techniques. Increasing motivation to use those techniques is a necessary concomitant.

An enormous amount of resources has gone into improving techniques, but only now are the qualitative factors inherent in motivation being seriously considered within the industry. There is still a long way to go. The majority of MIS departments are still unfamiliar with the techniques available.

DP professionals, by the nature of their jobs, are practically oriented. They want to work with tangibles. As Couger and Zawacki put it, "Lines of code per hour is a measure that can be substantiated. Degree of motivation cannot be seen, felt, tasted or smelled — nevertheless it exists."

There seems to be a good case for arguing that the quality of a product is related to the quality of the responsible organization and of the degree of job satisfaction within that organization. The question is, will 1982 be the year when these qualitative aspects come into their own?



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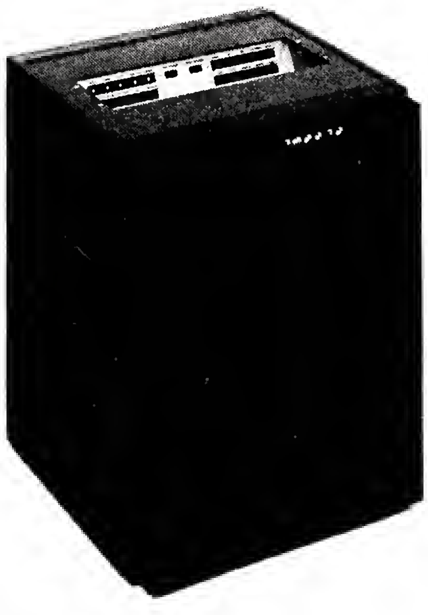

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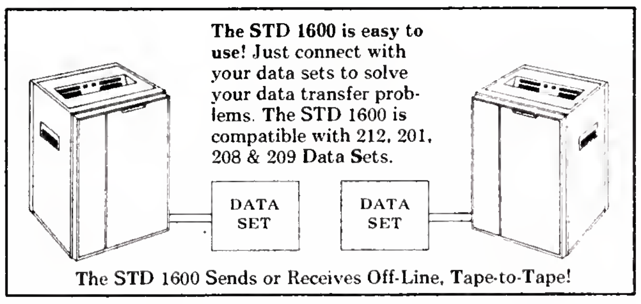

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Learning a Lesson From the Japanese

Theory Z

By Jack B. Rochester
CW Staff

As a discipline, modern management has been with us less than 50 years. It is a relatively new undertaking that gained credibility only during World War II.

Younger still is the computer industry. Although experts in their technical specialties, managers in the computer industry are relatively unskilled in human relations, financial management or productivity. Until recently, they never needed such skills. Now, they are essential.

In rising to the challenge and responsibility of management, DPers share the same problems as managers in most other industries. Their objective is to organize employees and the work environment to achieve productivity and profitability for the company.

As the DP function emerges as the repository for information —and thus the firm's most valuable resource — the DP manager is making the efforts necessary to ensure that productivity and profitability increase under his leadership.

Solving the Problems

Douglas McGregor, a professor at MIT, set forth in his book *The Human Side of Enterprise* (McGraw-Hill, 1960) two management styles: Theory X and Theory Y. Theory X assumes that people do not care to work, are irresponsible and need to be prodded by negative and parental incentives. Theory Y assumes that workers, when treated as adults, seek satisfaction and achievement in their work.

Over the years, management has gradually shifted its style from Theory X to Theory Y. In part, this is due, one might assume, to the changing nature of our culture and of work itself. In experiments allowing users to design and implement their own computer systems, for example, more and better results come from workers who feel valued and involved in their jobs.

Now a new management concept has emerged from studies and consulting projects by William Ouchi, a professor at the Graduate School of Management at the University of California at Los Angeles. It is called Theory Z and is fully explained in Ouchi's best-selling book of the same name (Addi-

Jack B. Rochester is senior editor for features at Computerworld.

son-Wesley, 1981). Theory Z takes a number of fundamental Japanese management techniques and applies them to American business practices. Ouchi has helped such firms as Intel Corp., Hewlett-Packard Co., IBM and others implement Theory Z with great success.

Of Men and Machines

Addressing a group of DP managers in San Francisco recently, Ouchi said, "I used to believe that what we see in American firms is a universal form of management, nothing more or less than common sense applied to a series of problems." But after examining the Japanese business environment, he said, he found this was not the case.

In his book, Ouchi says the Theory Z process "has the objective of developing the ability of an organization to coordinate *people*, not technology, to achieve productivity. In part, this involves developing people's skills, but in part it also involves the creation of new structures, incentives and a new philosophy of management."

Ouchi stresses that *one* manager, *one* department, can initiate Theory Z, but it can spread to other departments and should go to top management for total success. What follows are his 13 steps in implementing a Theory Z organization, with some examples and illustrations the DP manager will find useful.

Theory Z: The Process

Step One: Understand the Type Z Organization and Your Role. Ouchi's book is certainly the place to start for a thorough understanding of where you are and how to begin. Ouchi writes of how trust and a spirit of group participation help develop a shop in which problems can be discussed so changes can begin to occur. This takes time; people do not come into a room and immediately open up, but it is essential. Daniel Couger and Robert Zawacki, in their book *Motivating and Managing Computer Personnel* (John Wiley & Sons, Inc., 1980), say:

"Ranking of problems that concern managers place people problems at the top in almost every industry . . . The computer industry has some unique problems deriving from the technology and others caused by the unique characteristics of computer personnel. Our survey revealed two characteristics of computer personnel that require special management action — their low social need and their high growth need . . . DP managers must be more responsive to employee request and needs than their managerial counterparts in other parts of the company."

Step Two: Audit Your Company's Philosophy. The company philosophy determines how employees, clients and the community relate to a firm or department.

The company's philosophy can best be determined by an audit to determine:

- Which key decisions have succeeded, which have failed and why.
- Where inconsistencies have appeared in stated philosophy vs. actual practice.
- How management philosophy is linked to business strategy.

For example, a firm claims to encourage innovation. A job comes in to prepare a new program and a systems analyst says it could be prepared better and faster in a high-level query language than in Cobol. However, management policy says all programs must run in Cobol. Neither philosophy nor business strategy is served in such a case. Ouchi's book contains several Company Z philosophies, including HP's and Intel's.

Step Three: Define the Desired Management Philosophy and Involve the Company Leader. Top management support means essentially that some human communication has occurred and in the process both parties have agreed they have something to gain from the transaction. Both have perceived a need and both feel the need will be met by supporting the transaction.

The key is to demonstrate the need, which upper management must see as beneficial to corporate goals. And, clearly, more satisfied workers mean better quality work, which translates into increased operating efficiency and profit for the firm.

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Theory Z

Step Four: Implementing the Philosophy by Creating Both Structures and Incentives. There are many ways to get Theory Z going and a lot will depend on the prevailing style of management.

For example, some firms have a rigid hierarchy. In *The Art of Japanese Management* (Simon & Schuster, 1981) Richard Pacale and Anthony Athos tell of Harold Geneen, the controversial president of ITT, who was likened to General Patton: "He needed to let people know he was the boss, that he was the man in charge."

In a highly entertaining and enlightening book, *The Ropes to Skip and The Ropes to Know*, Richard Ritti and G. Ray Funkhauser (Grid Publishing, Inc., 1977), create a fictional corporation peopled by a wide variety of characters. In the book, Ted Selby gives a speech: "The thing to remember, gentlemen, is that, no matter how high up in The Company we are, we are all subordinates to *somebody*.

"From this perspective, it becomes crystal clear that superiors and subordinates up and down the line must have a clearly spelled out understanding of what is expected of each ... Briefly stated, the objective of Management by Objectives is to totally eliminate all possibilities of misunderstandings between superiors and subordinates and to assure that each man has a crisp and hard-hitting set of objectives to measure himself against."

> *'We have basically arranged our [American] companies like tinker toys. We have specialized skills and careers, organizations established in specialized and routinized jobs, and the result is you can snap the pieces in and out without losing too much. But the cost is that the whole structure never fits quite as well as you would like it to.'*

The important thing is to find the right place in which Theory Z can complement organizational needs.

Step Five: Develop Interpersonal Skills. "Interpersonal skills are central to the Z way of doing business, because working cooperatively and considerately is not just a means for soothing egos or getting your way ... Often, the skillful leader does more listening than talking," according to Ouchi. Communications is the catalyst for all organizational change and growth, and the increasing number of seminars on communications skills seems to attest to the fact that more and more DP managers want to learn how to communicate better.

Step Six: Test Yourself and the System. Ouchi advocates using the scientific method in assessing how Theory Z implementation is progressing. The hypothesis must be tested and verified, which seems simple enough. Often, though, it is more easily said than done. Formal measures mean everyone knows the facts, for better or worse. Yet it is only through tests that growth can be measured and fine-tuning the project for optimum results can be achieved.

Step Seven: Involve the Union. This is a special area for managerial skill, and for those who must deal with unions, Ouchi covers it well in the book.

Step Eight: Stabilize Employment. In the DP industry, a dissatisfied worker can often, and in less than a day, get a new job with a large salary increase. According to Ouchi, when talented people leave, it makes it more difficult to hire other talented people, results in higher turnover and diminishes the commitment of other employees to staying.

Step Nine: Decide on a System for Slow Evaluation and Promotion. Most young people today want to be promoted to a management position far too soon; in fact, this may be why, as a country, the U.S. has so many management problems. In a recent speech, Ouchi said, "We have basically arranged our [American] companies like tinker toys. We have specialized skills and careers, organizations established in specialized and routinized jobs, and the result is you can snap the pieces in and out without losing too much. But the cost is that the whole structure never fits quite as well as you would like it to.

"By comparison, the Japanese ... have developed a multiskilled work force which can be shifted around. They have paid the price of a slightly lower level of expertise in many areas, but in exchange what they have gained is a tremendously enhanced ability to achieve coordination across functions and specialties." It is simple: an employee who spends more time at a job learns how to perform it better.

Step Ten: Broaden Career Path Development. Yet if an employee stays in one position *too* long, he grows bored and less effective. By offering employees the option to move to other areas of the company — perhaps as project managers — DP managers offer everyone the opportunity to enhance corporate goals and objectives.

Step Eleven: Preparing for Implementation at the First Level. At the first level, according to Ouchi, managers must put Theory Z into practice — in effect, providing a good example for subordinates. This is, as Couger and

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Theory Z

Zawacki affirm, where the manager must provide the impetus and motivation, especially with DP people, whose needs for growth are extremely high.

Step Twelve: Seek Out Areas to Implement Participation. This involves asking employees to offer suggestions, to join in strategy meetings and to have some control of their jobs and work environment. They should also receive feedback to know they have been heard and to learn the outcome of their suggestions or participation.

Step Thirteen: Permit the Development of Holistic Relationships. This step builds upon the previous one by encouraging interpersonal relations, such as social get-togethers as well as informal meetings simply to discuss how things are going. Work groups that feel solidarity achieve more and feel more satisfaction and accomplishment as a result of knowing each other better. An example of this esprit de corps is found in the two groups — nicknamed "The Hardy Boys" and "The Microkids" — that built Data General Corp.'s MV-8000, and whose story was told by Tracy Kidder in the best-selling book, *The Soul of a New Machine* (Atlantic-Little, Brown, 1981).

Ouchi stresses that these 13 steps need not occur in set order; in fact, some managers may find they are practicing Theory Z in some of these areas already. And it may take several years to develop a full implementation.

Ouchi continues: "Type Z organizations have observed some believable signs that top management is committed. Evidence of smoother coordination, faster reaction, and more effective planning should begin to appear . . . The process of participative management, once begun, is largely self-sustaining because it appeals to the basic values of all employees. And in fact, the process promotes greater productivity and efficiency through better coordination."

If America is to survive the tremendous changes in its economy and business environment over the coming years, it will be on the strength of its ability to innovate and adapt.

As Russell Ackoff said in *Creating the Corporate Future* (John Wiley & Sons, 1981): "Adaptation to current rapid changes requires frequent and large adjustments of what we do and how we do it. Companies and governments are going out of business every day because they have failed to adapt to it or they have adapted too slowly.

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By **Tom Henkel**
CW Staff

Switching operating systems on the largest base of computer users in the world without them realizing it is a good trick by any stretch of the imagination. But when the magician is IBM and the stakes are high, seemingly miraculous events are not impossible.

The bulk of IBM's big systems software is pushing the 20-year mark, and the speed of IBM's 3081 processor family is challenging that aging software. Some industry experts maintain that IBM has already been forced to fine tune the MVS operating system to make the software run efficiently on the 10 million instructions per second (Mips) Model 3081D. The prospect of using that same software technology to run a 20-, 50- or 100-Mips processor seems unlikely, according to this group.

While some observers, including the Gartner Group's John Fram, predict that MVS, in some form, will probably be around for another 20 years, IBM will be adding more capabilities to its systems software in order to increase efficiency. Enhancements that have already been announced include cross-memory services, which allow a large program access to an additional address space, and a binary tree search.

The solution to the aging software problem seems to be a new operating system. The ideal system, some observers contend, would be one that departs from the traditional file-oriented MVS structure and looks more like the object-oriented structure of IBM's System/38 software.

But large IBM shops have become extremely entwined in IBM's current processing style. DP departments in these organizations have devoted countless hours and dollars to implementing current systems. Those users would no doubt be very upset at the prospect of IBM forcing them into major systems changes.

While it is architecturally possible to revamp MVS in order to make it resemble System/38 software "they would never change MVS to [create an] incompatibility [between earlier and newer software]," Fram said.

But IBM is in the throes of implementing major changes to its large systems software. The firm took the first step on what many experts contend will be a five-year road to a new operating system when it expanded the usable address space on the 3081 processor to 31 bits.

IBM's large processors have always employed a 32-bit architecture. But users were limited to accessing 24 bits.

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Tom Henkel is a senior writer for hardware at Computerworld.

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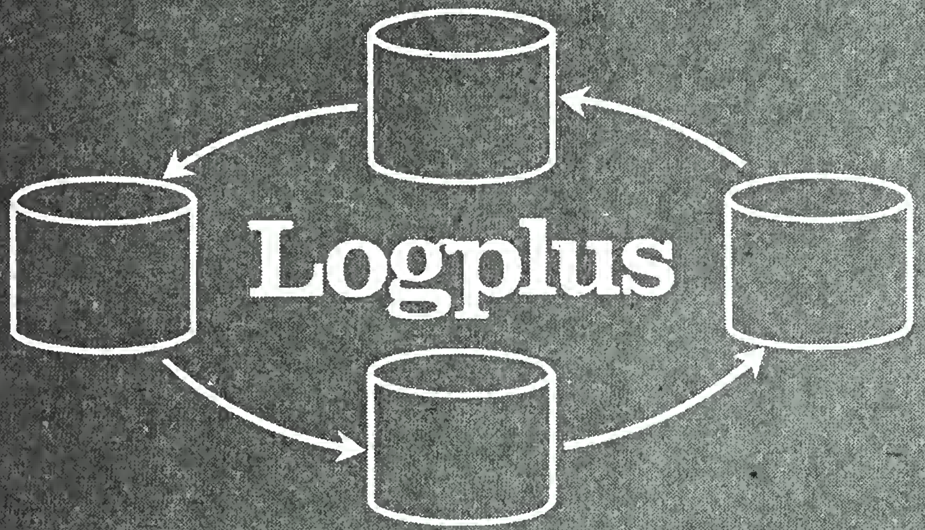

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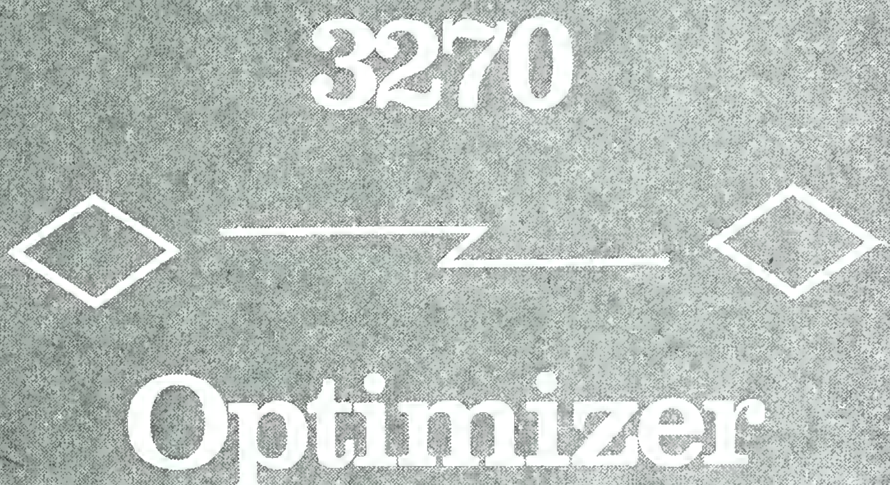

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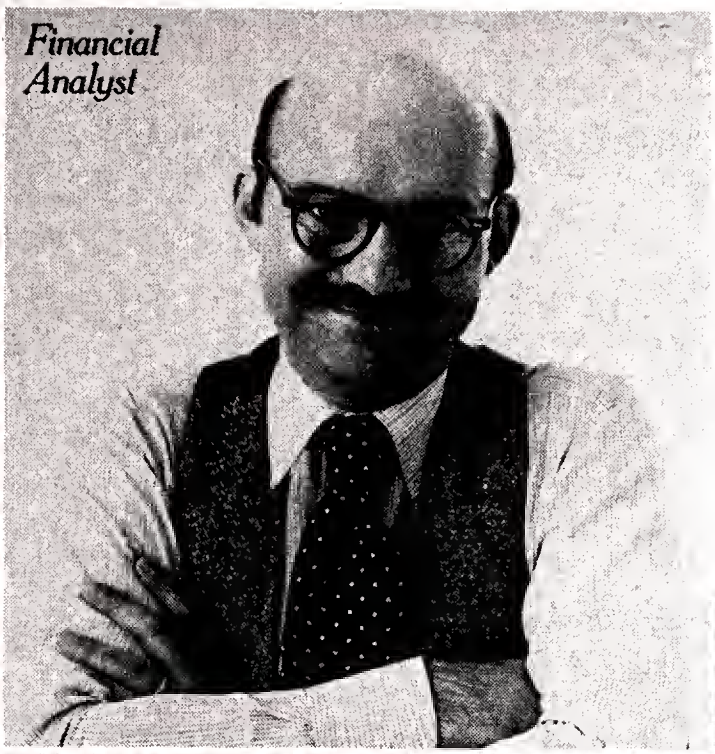

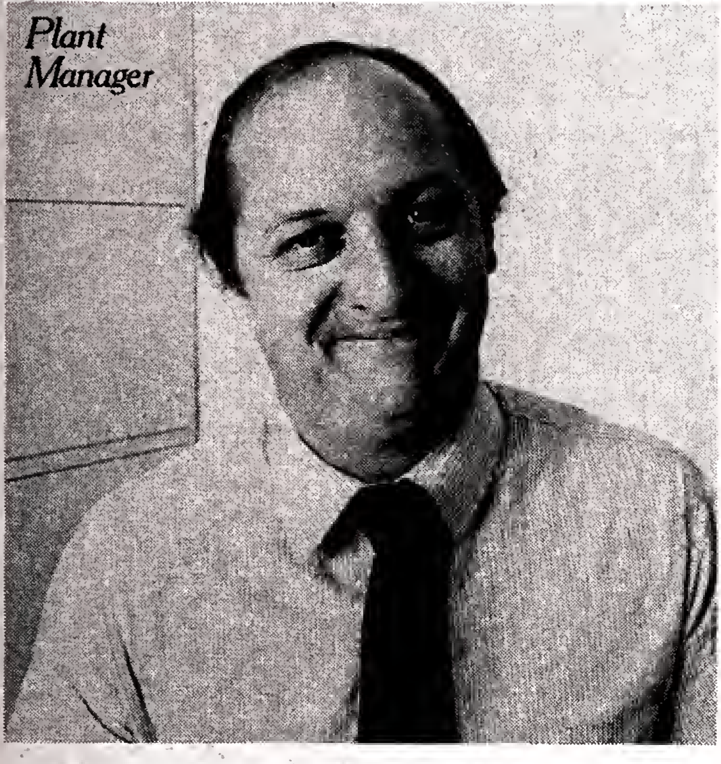

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Shazaam!

information per address space. The implementation of 31-bit addressing (the extra bit is used for processor housekeeping functions) means that users can access 2^{31}, or 2G bytes, of information.

At its most basic level, the 7-bit enhancement allows users to run much larger programs on IBM hardware. But some industry observers feel that the change may revolutionize DP for IBM users.

For example, the extra address space can be used to bring more virtual data into the program at execution time. Programs that execute in a 24-bit address space often do not contain all of the data necessary to process a given transaction. Instead, data is compartmentalized on disk storage media. When that data is required, the processor requests the information from the disk storage unit. And the number of paging calls that are necessary increases the time required to execute a given task.

New Operating Environments

IBM announced two new operating systems — MVS/XA and VM/XA — to support the extended addressing feature. While details are sketchy, the vendor has made it clear that the new operating environments will be capable of concurrently supporting both 24-bit and 31-bit programs. Most 24-bit programs will continue to execute in the storage below the 16M-byte level (see chart on Page 96). The 31-bit programs will execute in the full 2G-byte map. Software that is a combination of both 31- and 24-bit programs will also operate under MVS/XA, IBM said.

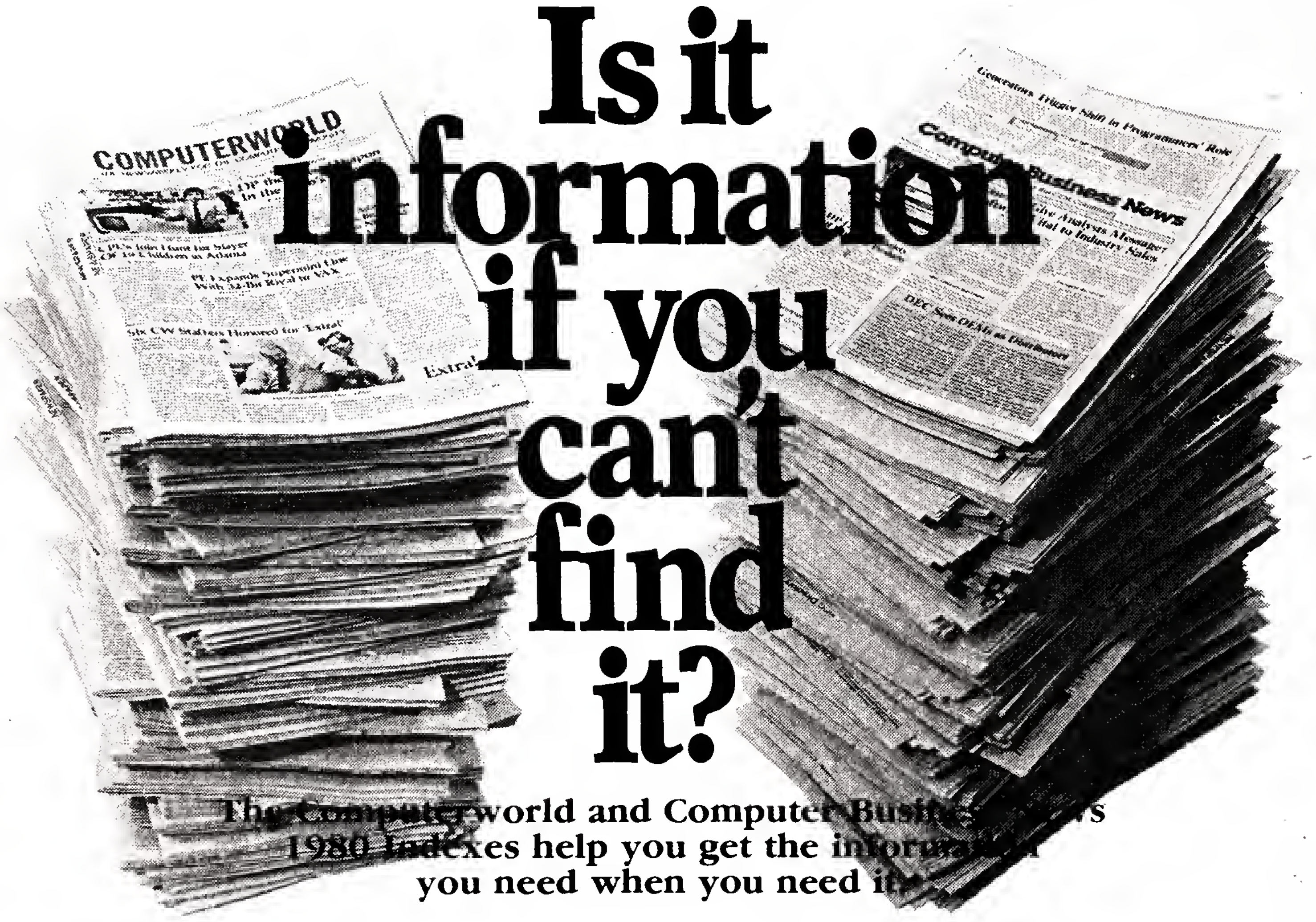
IBM is apparently trying to avoid any panic by offering its users a transition period. Industry observers maintain that this breathing space will last through most of this decade.

The firm is already taking steps to ensure that any necessary conversion goes smoothly. IBM estimates that at least three months will be required to migrate to MVS/XA when VM is used as a conversion aid, according to Fram. In planning for the conversion, IBM is asking users to pay for three months of on-site hand holding in advance. To get the most from the 3081 series, and quite possibly any yet-to-be-announced large processors, users may eventually have to go to an extended architecture. That could present some problems during the transition period.

While extending addressable storage from 16M bytes to 2G bytes seems to be a quantum leap, Ken Harvey, president of the Toronto-based CSP, Ken Harvey, Inc., said that it may not be enough.

Giving users a large amount of extra memory will only make them want more, according to Harvey. While a 2G-byte address space would appear to be more than adequate for most programs, many users have far more than 2G bytes of data. And bringing that amount of information into the processor along with the programs would make even a 31-bit address space inadequate, he noted.

That sort of situation might mean a rush on the main memory market. Prior to the emergence of 31-bit addressing, it was not possible to utilize more than the 32M-byte maximum main memory. However, the new addressing capability will result in pressure on IBM as well as plug-compatible manufacturers for additonal memory boards, he said. Fram maintained that this pressure will



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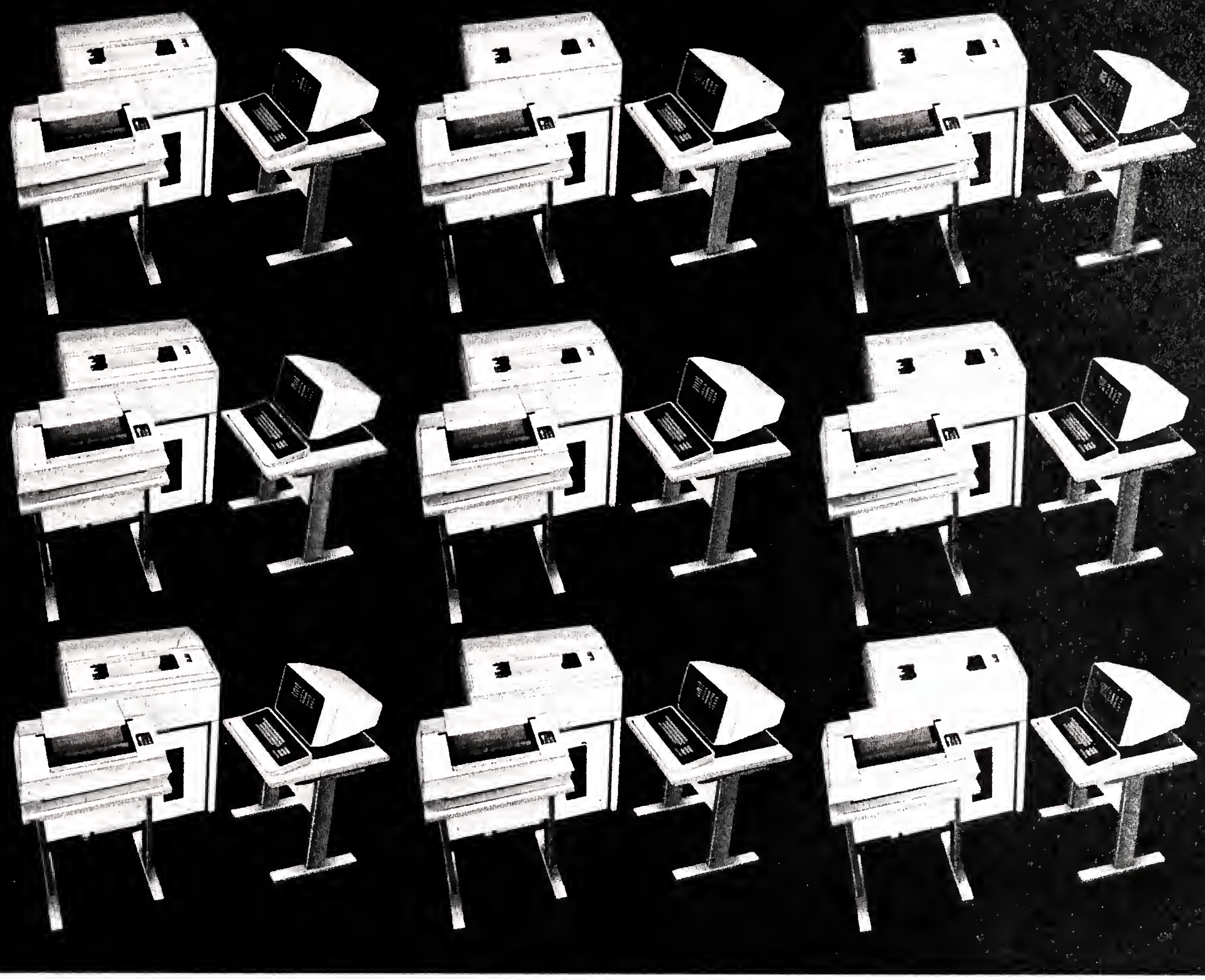

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not develop until the next decade.

Although recompiling some programs may be necessary, high-level language programs will not be severely affected by IBM's switch to 31-bit addressing, according to Dennis V. Vohs, group vice-president at Management Sciences America, Inc. (MSA), a major supplier of IBM-compatible software. Programs that deal at the assembler language level may be problem areas, he said.

However, vendors of data base management systems (DBMS), which operate with lower-level languages, maintain that 31-bit addressing will not present a problem.

"I'm glad they did it. It makes it easier for us," Ron Weeks, with Cincom Systems, Inc., vendors of the Total DBMS, said. In itself, 31-bit addressing does not mean much, he added. When it is combined with other enhancements, such as a binary tree search and data compacting features, the potential exists for IBM to improve the way its processors can run DBMS, he noted.

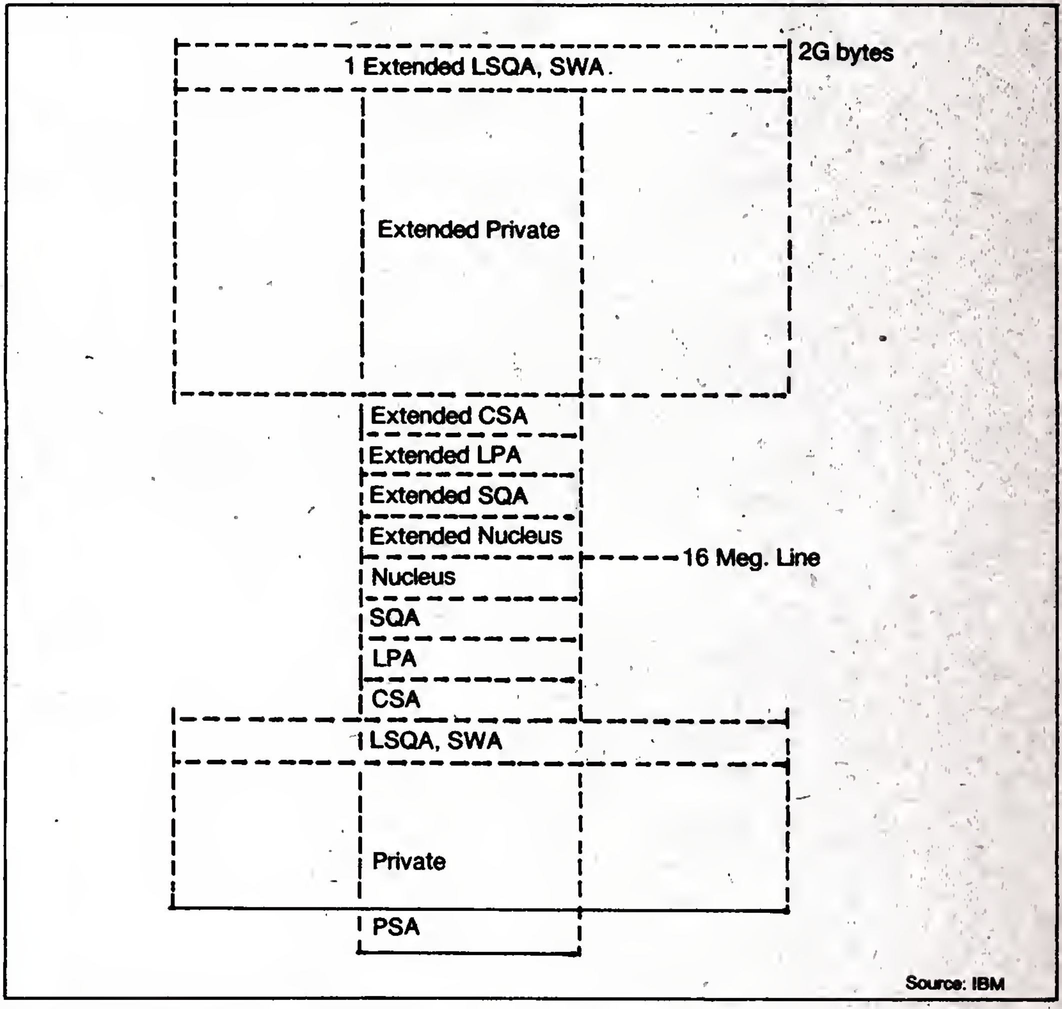
One advantage for DBMS vendors is IBM's way of introducing the new operating software. "They'll build it as fast as the competition forces them to," Weeks said. That also means that DBMS suppliers will have ample time to make any necessary changes to their products to make them conform to IBM's new operating modes.

Both Weeks and Bob Goldman, executive vice-president at Cullinane Database Systems, Inc., insist that adapting to 31-bit addressing is not a problem. MSA's Vohs maintained that adaptation is not even an issue for high-level language suppliers.

However, 31-bit addressing, and its immediate implications, may be only the tip of the IBM iceberg. The much talked about, and long awaited, relational data base — System R — is once again rumored to be ready for introduction.

At this point, System R exists only in the minds of those who make their living from watching IBM. And some observers feel that IBM has learned a lesson during the past 20 years: Never introduce a major product to users in one fell swoop.

Virtually every time IBM did not follow that rule — with the 8100 system, for example — there has been an acceptance problem.



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The Rocky Road to Office Automation

On Course?

By Ann Dooley
Special to CW

Navigating through the seas of office automation (OA) during 1981 was essentially a matter of trial and error for both prospective users and OA vendors. The OA onslaught has been a subject of discussion for several years. But it was not until 1981 that OA became a reality for these prospective users and a major factor in the marketing strategies of OA vendors.

As with any young industry, problems exist. Promises are made and not necessarily kept. Users are confused or frightened about the new technology and its potential effect on their jobs. Organizations are grappling with integration, cost justification and implementation procedures with the certain knowledge that efforts in these areas are just beginning.

Most users are still hovering at the brink of OA. A few large firms have implemented pilot studies — and even fewer have installed some sophisticated systems. But OA remains a buzzword to many companies that have, to date, limited their commitment to implementing word processing in specific departments.

A recent survey of nearly 400 *Computerworld* readers illustrated the status of OA during 1981 and shed some light on areas that will concern users over the next year. The results look promising for OA's future. Most respondents — nearly 72% — are now using some form of an OA system in their companies. Of the remainder, 51.9% are exploring the possibility, 11.1% are currently evaluating applications, 8.3% are evaluating vendors and 2.8% are waiting for a system to be installed. There are some holdouts to the technology, however. Nearly 42% of those 6% not currently using OA techniques do not expect to venture into the OA arena in the foreseeable future.

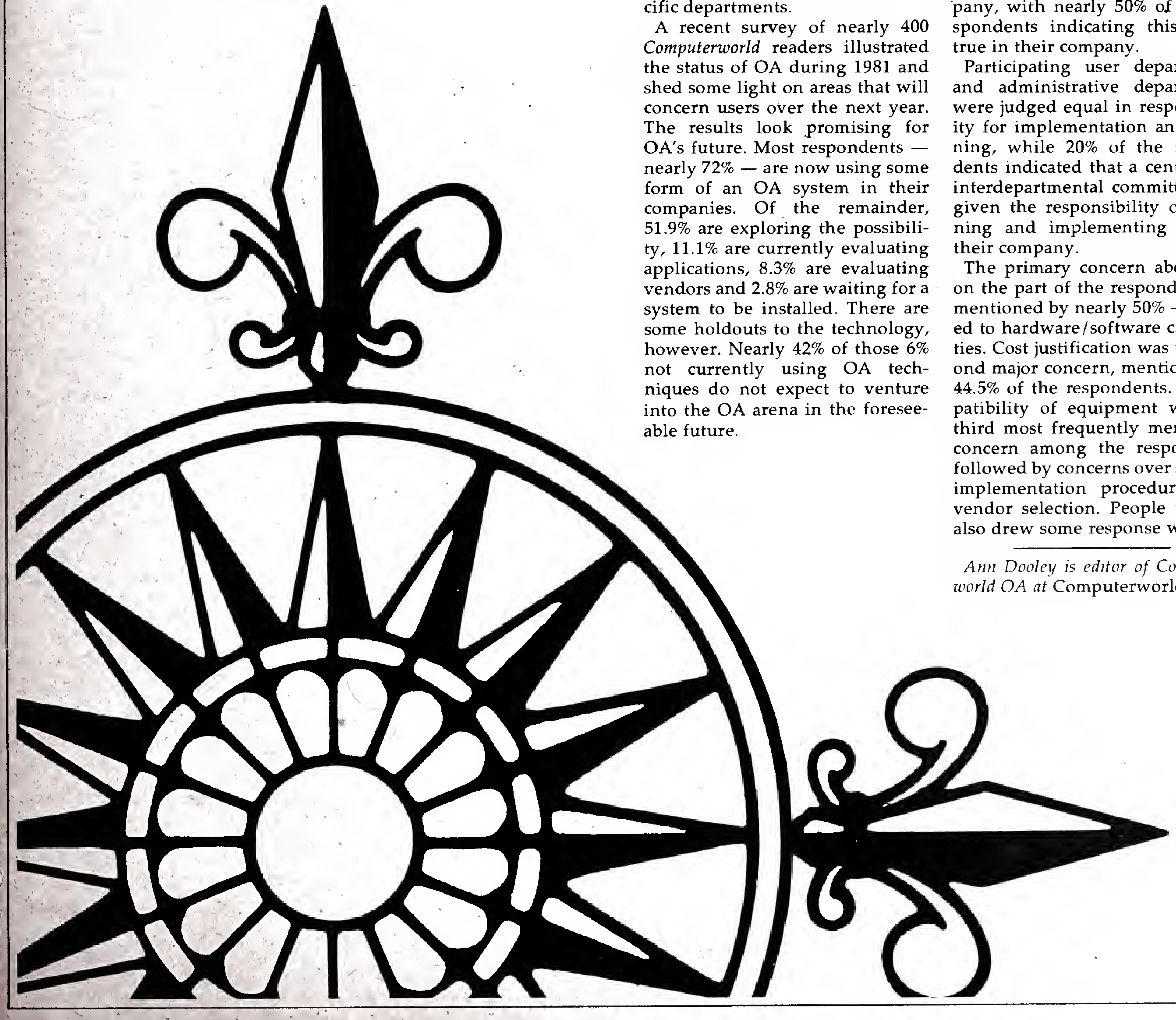
In 1981, OA seems to have stayed within the jurisdiction of most organizations' technical branches. More than one-third (36.3%) of those departments charged with operating their company's OA system were in the DP/management information systems (MIS) sector.

End-user departments were most frequently responsible for operating their own systems. The administration department came next with 14.9%, followed by the WP department with 9.3%. The DP/MIS department was also the overwhelmingly favorite chosen for planning and implementing automated office procedures in a company, with nearly 50% of the respondents indicating this to be true in their company.

Participating user departments and administrative departments were judged equal in responsibility for implementation and planning, while 20% of the respondents indicated that a centralized interdepartmental committee was given the responsibility of planning and implementing OA in their company.

The primary concern about OA on the part of the respondents — mentioned by nearly 50% — related to hardware/software capabilities. Cost justification was the second major concern, mentioned by 44.5% of the respondents. Incompatibility of equipment was the third most frequently mentioned concern among the respondents followed by concerns over service, implementation procedures and vendor selection. People worries also drew some response with the

Ann Dooley is editor of Computerworld OA at Computerworld.



On Course?

difficulty of selling management on the need for OA and selling staff on the usage being mentioned by large numbers of respondents. Local-area communications networks were listed as a major concern by the respondents, who also expressed a fear over equipment obsolescence.

Respondents indicated that the OA equipment already in use in their organizations included integrated computer systems followed by stand-alone word processors, intelligent terminals and clustered word processors.

What will their major purchases be next year? Top choices for additional equipment will follow along the same lines as the current top installed base. Integrated systems, intelligent terminals and stand-alone and clustered word processors are seen as the most frequent additional purchases with computer graphics coming in fifth place. Among new purchases, relational data bases came in first, word processors will be bought in high numbers and computer graphics and intelligent terminals will be among the top choices for new purchases (see related chart).

	Currently Use	Plan to Purchase Additional	Plan to Purchase New
Integrated computer systems	69.2%	12.5%	5.2%
Electronic mail	16.6	3.5	8.4%
Word processor — stand-alone	54.1	10.5	9.9
Word processor — clustered	30.8	8.1	8.7
Teleconferencing	14.2	.6	3.2
Computer graphics	23.5	6.4	8.4
Micrographics	16.9	3.8	3.5
Local networks	26.5	3.8	6.7
Records management	20.6	1.2	7.0
Facsimile	26.2	2.6	2.6
Management workstation	8.4	2.6	4.9
OCR	10.5	1.5	4.1
Intelligent terminals	37.2	10.2	7.3
Intelligent copiers/printers	14.2	2.0	4.4
Relational data base software	18.9	2.3	10.2
Private phone systems (i.e. PBX)	37.8	3.8	5.5

CW Chart

Current Usage or Purchasing Plans for OA Equipment

Most of the survey respondents viewed automating the office in fairly simplistic terms. They considered OA techniques as a means of automating manual procedures, reducing paper or increasing productivity without having any definitive idea of how this is to be accomplished. Others saw OA in terms of technologies — electronic mail or WP, for example — rather than in terms of what OA can mean to the end user through specific applications.

One of the major stumbling blocks to widespread, efficient implementation of OA is the lack of equipment standards. Users who began implementing OA, department by department, are increasingly concerned as they discover that equipment is incompatible and incapable of communications. An International Data Corp. (IDC) report "Office Automation: Blueprint for the '80s" stated that 88% of the companies it surveyed are experiencing problems due to the lack of standardization. This problem will continue for the forseeable future, with more companies running up against the dilemma in 1982.

Most pilot projects implemented during 1981 were in WP applications, followed by electronic mail and then WP interfaces with the host computer, electronic filing and document retrieval and micrographics interface. A number of pilot projects were started this year and as many as 30% of all U.S. companies initiated project planning, according to Walter Ulrich, president of Walter Ulrich Consulting.

As user needs for information increased, OA conferences proliferated during the past year. The buzzwords heard at every conference dealt with increasing managerial effectiveness, reducing the cost of performing office functions and increasing white-collar productivity. The problems users were most eager to learn about included resistance to change by management and staff, cost effectiveness and educating management on the benefits of automating the office.

In 1981, the beginnings of a power struggle over who would control the OA process began. Should it be under the jurisdiction of administrative department personnel who are most frequently knowledgeable about their organization and dealing with people, or the DP/MIS department, which understands and can implement the technology? The question will not be solved during the next year and will probably rage on for several more years until OA becomes more firmly established in individual companies.

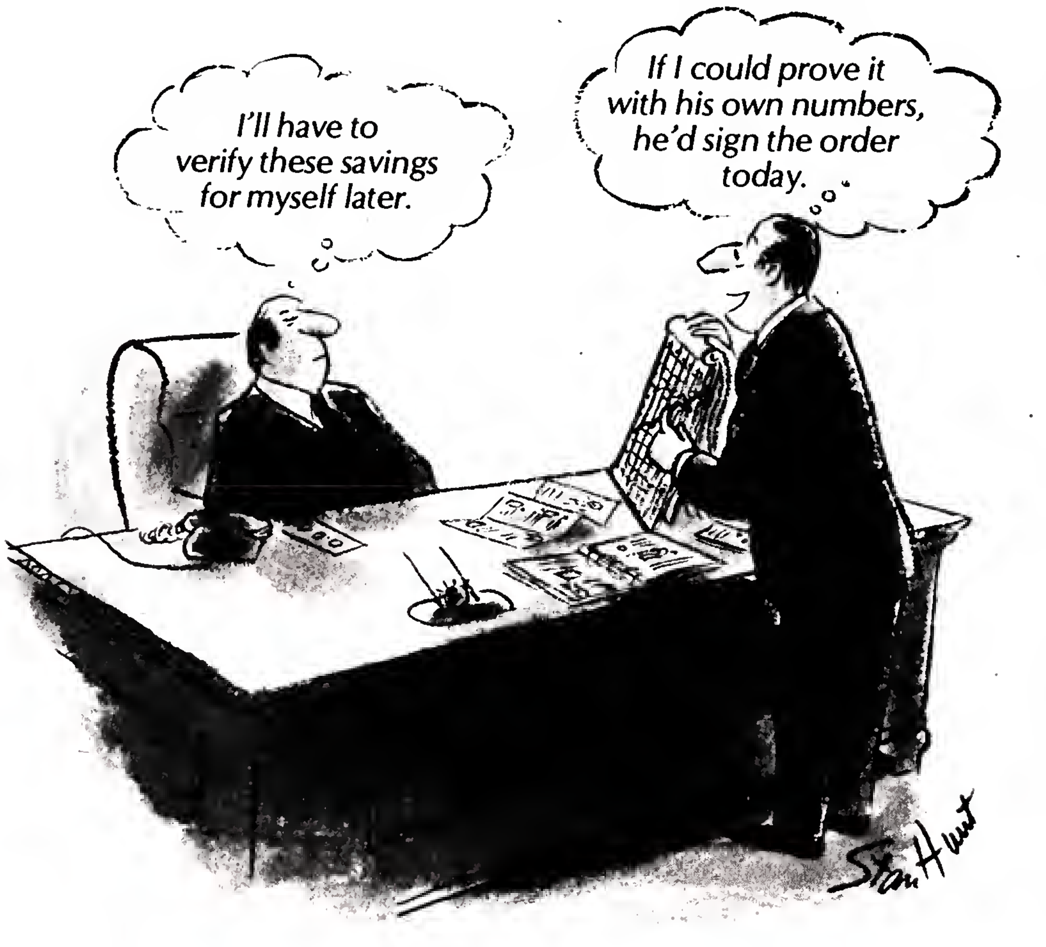
Technology Trends

New technology proliferated this year as product after product was introduced. Some were even announced on the same day and at the same hour. Some analysts fear that vendors are concentrating on making these announcements rather than on selling office products that can be made immediately available to users. "Everyone's in it — it's not just a hot market, they're in it for their survival," David Terrie, IDC's manager of OA services, stated.

Technological development in the OA sector is increasing so fast that users have a hard time staying on top of new products, let alone starting to set realistic implementation strategies.

Technological breakthroughs to watch for in 1982 and beyond will include alternative input devices such as the Xerox Star Mouse, transient menus that quickly appear at the push of a button, on-line tutorials, nonprocedural languages and friendliness in systems, according to Caroline Watteeau, vice-president of Office of the Future, Inc. in Guttenberg, N.J.

High-level programming languages like Pascal, Unix and Xerox's Mesa will become more commonplace. Desktop laser printers — some from the Japanese companies — and new print technologies will be more prevalent. More powerful personal computers will begin to gain increased attention. And almost all top private branch exchange (PBX) vendors introduced an integrated voice/data feature that enables PBX to sup-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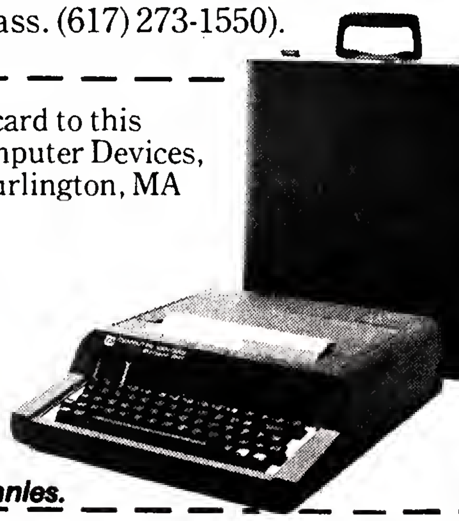

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port low-volume users for electronic mail, according to Ulrich, who rated this as one of the most important events in 1981.

Low-cost terminals proliferated, enabling the low-frequency user to seriously consider them, another important 1981 landmark. Reducing costs to a generally affordable level will open up a threshold market, according to Ulrich. Low cost is more important during a start-up phase than high functionality in order to gain widespread interest, the Houston-based consultant stated. Printer costs also dropped dramatically, which correspondingly reduced the price of stand-alone systems, IDC's Terrie said.

A number of coaxial cable local-area networks were announced with Wang Laboratories, Inc.'s Wangnet, attracting a large amount of attention when it entered the competitive fray against Xerox's Ethernet.

Confusion and controversy concerning local-area networks abounded in 1981. Local nets were the buzzwords of 1981 and will probably hold that title in 1982 as the battle between baseband and broadband technology continues to rage. Nineteen hundred eighty-one was supposed to see Xerox's Ethernet local-area network become a defacto standard and it is significant that it has not been accepted.

Instead of the cooperative environment Xerox hoped would develop, an intensely competitive and uncertain environment exists and will probably continue to do so for the near future. IBM is also expected to announce its local-area network strategy in the first portion of 1982.

The hesitancy to accept a standard has deterred growth in the industry, according to Melody Johnson, an analyst at Kidder, Peabody & Co., Inc. in New York. Large companies that are change agents are adopting a wait-and-see attitude about local nets, she stated.

For the user, this means that there will be no simple solution. Users will have to survey all of the alternatives and possible repercussions.

In 1982, integration will continue to be a major factor in the industry with more voice/text message systems being introduced or enhanced. Companies will begin to implement integrated communications networks in which one line shares voice/data/text.

Some analysts speculate that AT&T will play a greater role next year in OA. IBM is expected to continue in a dominant position and Exxon Office Systems, which had a disappointing year in 1981, will see the same thing happen in 1982. Datapoint Corp. should continue to show a strong presence, according to observers. Wang, according to analyst Ulrich, did a "dynamite" job in terms of delivering products in '81 and will continue to play an important role in '82.

The outlook for both NBI, Inc. and CPT Corp. appears optimistic since both companies offer shared-resource systems as well as stand-alone products, according to Kidder Peabody's Johnson. These companies can exploit the small and medium-size markets that the larger vendors are bypassing as they strive to attract Fortune 1000 users. However, completely stand-alone vendors must carve out their own niche in order to survive, she noted.

According to Johnson, some leading-edge products that appeared on the scene this year included Wang's audio workstation and voice message system, the Xerox Star and the Datapoint laser printer. By rushing into the OA marketplace, major vendors are legitimizing it in the eyes of users and also admitting to themselves its true dollar potential, Johnson remarked. Video disks, which were just gaining attention on the OA scene in 1981, are expected to emerge and become more of a reality in 1982.

The proliferation of low-priced workstations is expected to continue next year with more tested versions on the scene. The professional workstations like the Star and Wang's Alliance were significant beginnings, most analysts agree.

Next year will see large amounts of effort going toward research and development and pilot projects rather than in placing large orders for equipment, according to Boston analyst Thomas Billadeau, president of Automated Office Systems.

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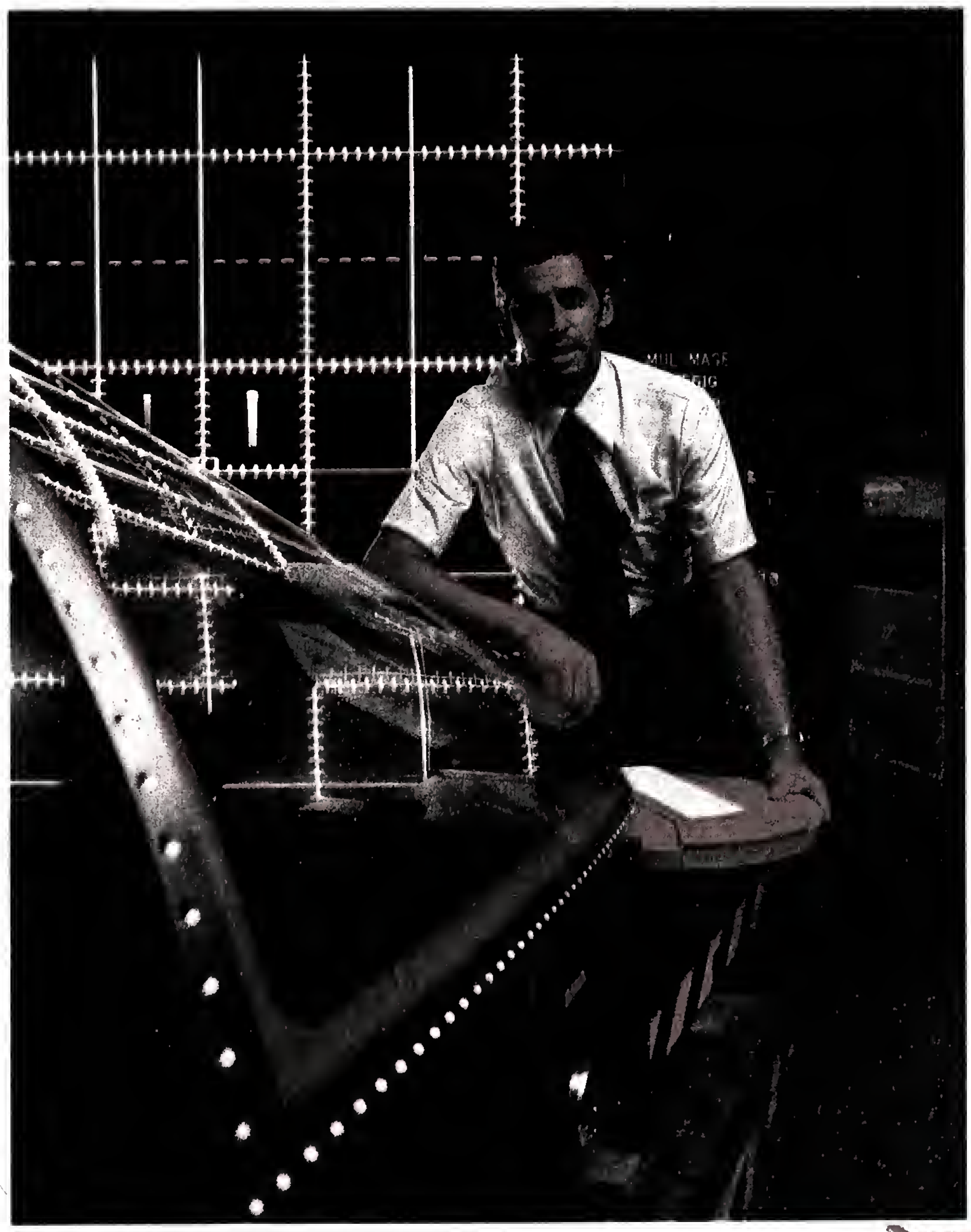

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Trouble in the Ranks

Operations

By Bob Johnson
CW New York Bureau

Computer operations. Considered by many to be the backbone of a computer installation, the operations area is staffed by people who lately have voiced concern about their jobs, professional status and career paths.

Why this growing discontent within the operations ranks? And what does it mean for management?

Part of the answer to both questions lies in what many observers perceive as a new role for operations personnel.

The duties of the computer operator are changing as fast as the industry itself. In the early days of DP, computer operators resembled heavy equipment operators more than high-technology workers. Manual dexterity and a certain knowledge of electronics were the primary skills required.

Today, with on-line systems, direct access, mass storage devices and sophisticated systems software that almost monitors itself, the operator is less physically involved. However, paradoxically he is much more responsible for the successful functioning of the entire processing environment.

Computer operators, according to figures published by the Association for Computing Machinery (ACM), spend about 90% of their time interfacing with software. They are also required to have a complete command of job control languages (JCL)

As a result, a new sense of job pride and professionalism is permeating operations departments. Operators know they are in key positions, but are miffed about being treated as second-class citizens in the DP world.

Observers believe that disenchantment among operations personnel will grow as their numbers increase. And the number of operators is expected to grow faster during the '80s than in the last decade.

According to the Bureau of Labor Statistics' *Occupational Handbook,* some 275,000 people functioned as computer operations personnel in 1980, which represented an 83% increase over 1970. In addition, this segment of the DP field is expected to increase 116% over the 1970 mark by 1990, accounting for a powerful work force that must be dealt with by DP management.

Very few DP professionals working outside of the operations area can claim as diversified an amount of overall DP experience as can the computer operator. In large DP shops, most operators have been exposed to hardware, soft-

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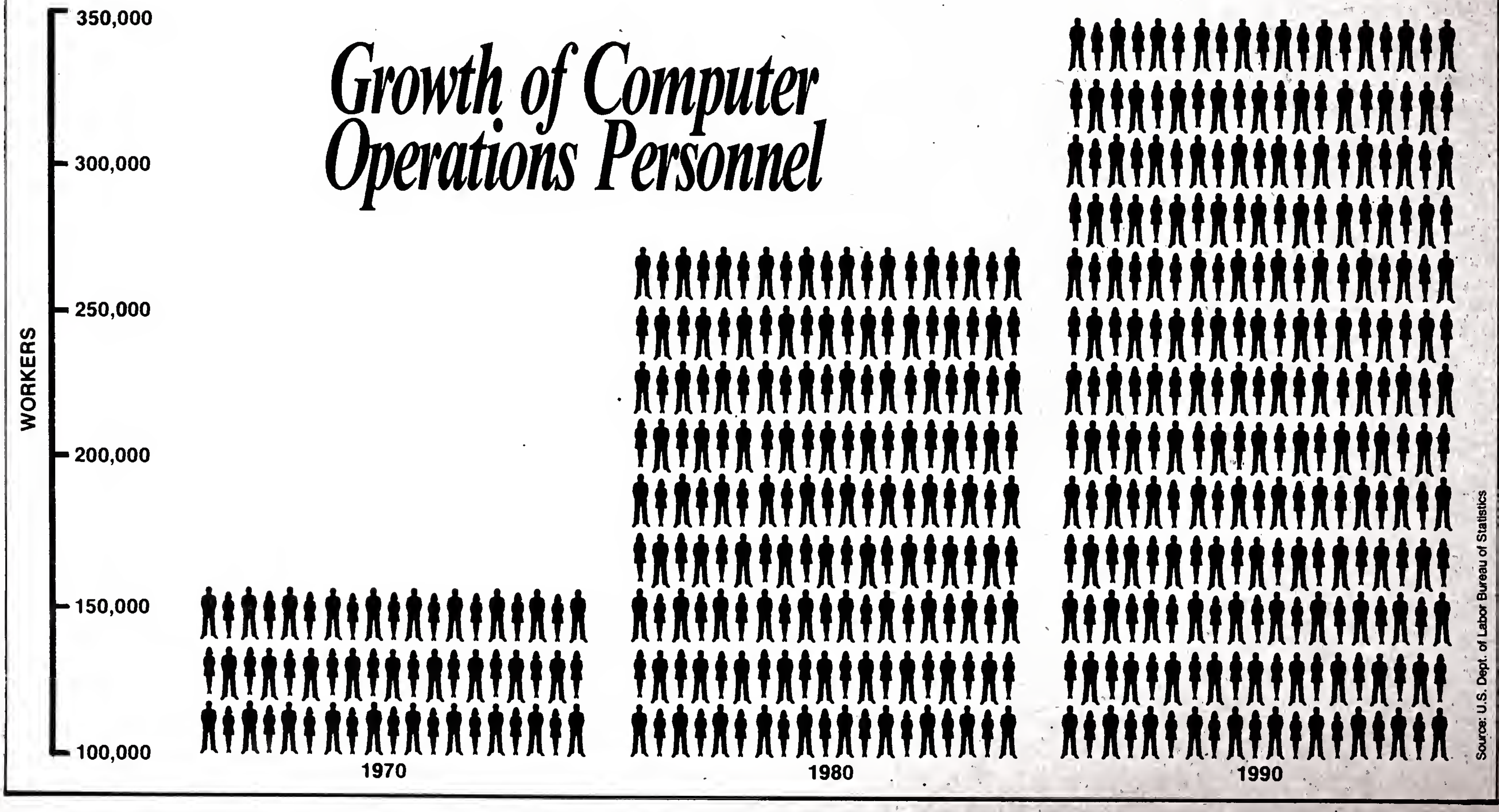
Bob Johnson is New York correspondent for Computerworld.



Growth of Computer Operations Personnel

Source: U.S. Dept. of Labor Bureau of Statistics

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Forecast

Operations

ware, telecommunications, I/O, job scheduling and computer security. In addition, many operators function as liaisons with user departments.

The DP manager should realize that a good operator is a valuable asset. Most managers will admit to sleeping more peacefully with the knowledge that a top-notch operator can handle a JCL problem at 3 a.m. — an ability that more than once has saved the nightly production processing flow. But many operators who perceive themselves as technical professionals — or at least as paraprofessionals — feel that they are taken for granted by their managers.

Problems with the computer operations area have already surfaced. The lack of recognized professional status and the salary that goes along with that status, has resulted in a problem common to shops across the country — high personnel turnover.

According to the Association For Computer Operations Managers (Afcom), qualified computer operators are in high demand and are offered everything from "recruiting bonuses to three-day work weeks." Companies with dissatisfied operators are rapidly losing them to offers of more money. And it is the smart manager who is beginning to address this career problem.

Afcom stated that a common complaint among operations managers is that they "train them [computer operators] and lose them." However, the association advises that the keys to retaining operations personnel lies in several areas. These include offering training programs, developing a sense of loyalty and instilling a sense of pride and professionalism in the job.

Naturally, salary incentives are important. A survey of operations managers by Afcom showed that the national average salary of a senior computer operator is just $16,500 per year. Considering the responsibilities and time required (usually three to five years) to attain this position, the salary is comparatively low to that of a programmer with the same number of years experience. Some programmers, in fact, could be earning double that figure in the same time span. This illustrates the money problem facing management and is probably a major cause of the high-turnover rate and low self-esteem that plagues the operations area.

Career Preferences

Another Afcom survey that gauged the opinions of 137 managers across the country showed that the major career preference of today's computer operator is a desire to move into programming. An analysis of the data revealed that the programming career choice of operators coincided with the area that DP managers believed to be the most promising in terms of success.

Building a career within the operations area was not greatly sought after by operators, nor was it rated highly in terms of reaching maximum success by managers. Operators feel that they are on the bottom rung of the organizational ladder with nowhere to go and their managers seem to agree with them.

However, technology seems to dictate otherwise. If the increasingly sophisticated operations area is continually staffed with rookies and transients, the DP manager may wake up some morning to find his 3 a.m. JCL problem unresolved. Afcom asks, "Where does this indication by operations managers themselves that operations is not only *not* the best place to launch a career, but in fact the least desirable, leave the current operator in that position . . . [who is]

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COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

trying to build a career from there?"

The professional computer operator seems to be in limbo. He is caught between doing a good job in his present position, expecting to be compensated for it and a dead-end, unprestigious career path. Carmen Winbush, an assistant computer operations manager for Manufacturers Hanover Trust Co. in New York and a former front-line operator herself, had some definite ideas about the operator's career path.

"The problem lies within the hierarchy of the operations department. The career path is limited, so action must be taken by management to make the position desirable."

One problem Winbush mentioned was programmers' view of operations personnel. "When I was an operator I knew programmers thought operators were beneath them. But I realized that they needed my help to get the job done. They couldn't do anything unless I cooperated with them. This is what I try to do in our shop. I foster a partnership atmosphere where operators feel good about themselves."

Agreeing with Winbush was Rudolph Simmons, an 11-year veteran of operations at one of Manufacturers Hanover's remote sites.

"Programmers malign operators to a great extent. They do not take into account that after a program is written it is the operator who has to live with it, know its operating problems and fix them when programmers are not available," he said. He added that operators must know what the programmer is doing, what a user needs and a shop's devices' idiosyncracies.

Managers who *are* aware of the existing problems will no doubt be content with their data centers in the future. One such manager is Walter Frigon of Time/Life Inc.'s subsidiary Home Box Office. Frigon maintained that he pays attention to his shift supervisors' and operators' short- and long-range objectives.

"My policy is to use the data center as a drawing pool for the programming and tech support areas," he said. Offering a career path to the operator means that he will probably stay with the company, he added. However, there is one problem that tends to surface in some shops. According to Frigon, when a company finds a good operator who can handle most situations, the firm tends to keep him in the operations area. This tendency stymies the operator's professional growth and leaves operations management ripe for trouble.

The best way to enhance a computer operator's career is to keep him involved with all aspects of the data center, according to Mike Casale, an operations manager for the U.S. Trust Co. of New York.

"In our shop, which consists of 32 operators working a rotating three-day shift, each operator moves from area to area so that he is exposed to all facets of the operation. In this way operators feel totally involved in all aspects of the operation," he said.

Henry Carney, vice-president of operations at U.S. Trust, acknowledged that DP shops inevitably lose some good operators because of career moves. But he pointed out U.S. Trust is working on plans to create an operations support technician position on the same organizational level as a junior programmer.

Carney also noted that selling upper management on the importance of operators and the operations area has been a long-standing problem.

"The importance of operations personnel has been elevated, especially because of teleprocessing."

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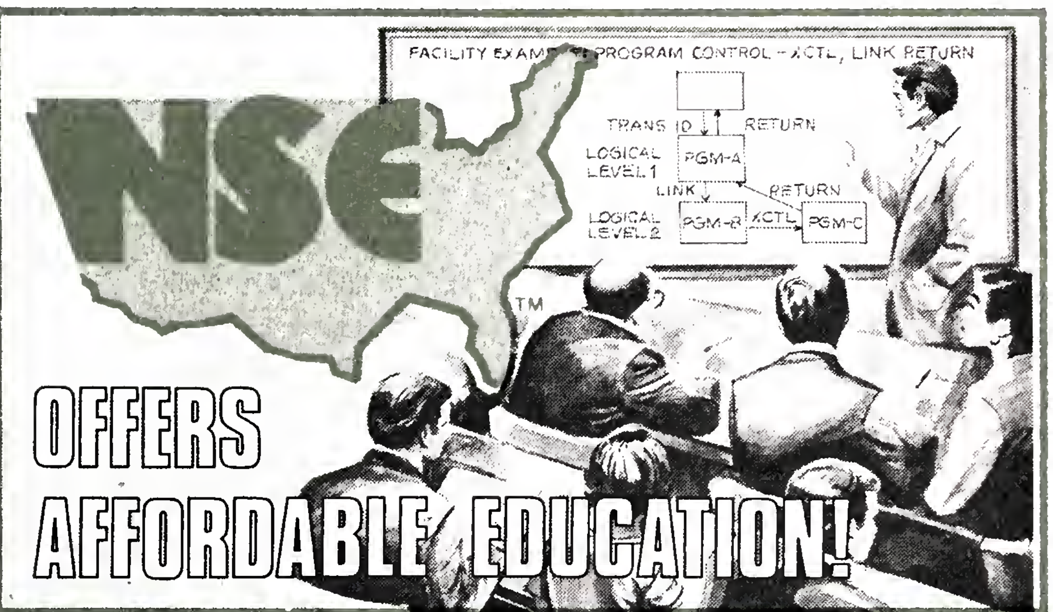

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Patco Walks. Reagan Balks. No Sign of Talks.

No Deal

By Marguerite Zientara
CW Staff

Will the Reagan administration soften its stand and rehire the 11,500 striking air traffic controllers (ATC) that it unconditionally fired last August?

Federal Aviation Administration (FAA) Chief J. Lynn Helms "is unequivocal on that point — there's no way they're ever coming back as controllers," according to FAA spokesman Jerry Lavey. "They'll absolutely never be allowed back."

President Reagan's recent announcement that fired controllers are now eligible to apply for non-FAA-only federal jobs reinforces that view. Professional Air Traffic Controllers Organization (Patco) spokeswoman Marcia Feldman called it "a cruel hoax" to offer federal employment at a time when federal agencies are cutting back personnel. "We're deeply disappointed," she said.

Patco's apparently irrevocable strike action occurred Aug. 3, when 13,000 Patco members — out of a total ATC force of 17,200 — walked off their jobs.

With union demands ranging from improved wages and benefits and a shorter work week to improvements to the system's reportedly antiquated IBM 360/65-based computerized radar equipment, Patco President Robert Poli took an immovable stance that ultimately backfired.

"Really, [the FAA] wanted to get rid of 5,000 troublemakers and the strike was a good opportunity to do that," according to John Galipault, president of the independent, nonprofit Aviation Safety Institute (ASI) in Worthington, Ohio. However, there are three conditions that could inspire the rehiring of the fired controllers, an estimated 75% of whom want to return to work, according to Galipault:

- If the airlines pressure Reagan to take the controllers back.
- If there is an air disaster.
- If the ATC system steadily increases its capacity.

If, in the near future, any of these things happen, "Reagan would probably have some [controllers] back before Christmas, although it would be very selective hiring," he said.

According to a recent issue of ASI's *Monitor* newsletter, "There appears to be a concensus that the aviation industry is not presently suffering enough to bring pressure on the administration to hire back any fired controllers."

In ASI interviews with various aviation experts, the *Monitor* continued, "Most people did express the individual view that it would be nice to have back those competent, qualified and misguided controllers who had been caught up in the emotion of August 3rd.

"All agreed that an infusion of 4,000 qualified controllers would go a long way toward restoring the National Airspace System to a productive level for all users."

Marguerite Zientara is a writer/analyst at Computerworld.

No Deal

When asked if the rehiring would improve the current controller situation — now operating at 58% of the prestrike staffing level and up to 78% of prestrike air traffic levels — FAA spokesman Lavey said, "It may do that, although in terms of morale, it wouldn't be worth it.

"There's a great deal of ill feeling [between strikers and nonstrikers] that was exacerbated before the strike," Lavey said. "If you put the two [groups] together you'd be buying problems.

"Some [nonstrikers] would walk off the job, others would take early retirement, according to our phone calls," he explained. "Morale [in the system] is very good now — they know they're doing something very valuable. Rehiring would be disastrous."

Besides the specter of nonstrikers suddenly quitting if the strikers returned, "some allege that Patco has a 'hit list' on working controllers who would be threatened to varying degrees," according to the *Monitor.*

"There could, in effect, be a range war within any ATC facility — to the point that two aircraft could be pointed at each other down to critical distances and the blame engineered for the nonstriker," the *Monitor* continued.

"This happened in rare instances before the strike for different reasons," the newsletter added, "but the specter of any gross action causes ASI to worry about the safety of such a scenario; the FAA shares this concern."

The controller force now numbers 10,000, including supervisors, military controllers and a mere 290 controllers who were reemployed during the firing grace period. With 58% of the former corps controlling up to 78% of air traffic, one might well ask whether the skies are safe for travelers.

"The system is at least as safe as before," according to Lavey. "I would say 'safer,' but I couldn't make a case for it," he added, noting that aircraft separation is now 30 to 40 miles in some cases vs. the prestrike separation standards of five miles.

ATC procedures have been simplified, the airlines have cut back flights by 5% and there is now a general aviation reservation plan that did not previously exist, he explained.

In addition, while at first the skeleton crew of controllers was working as many as 60 hours a week, now 50 hours is the maximum and they are taking "as much vacation as possible," he said.

Fatigue Still Factor

Nevertheless, fatigue among working controllers could have "the potential of a time bomb" in the future, according to James B. King, chairman of the National Transportation Safety Board.

A 16-member task force that examined the ATC system for two months after the firing, found that, while air travel is presently safe in spite of fewer controllers, "the question of stress and fatigue continues [to be a factor] in this whole process," according to King.

Noting that the number of reported near-midair collisions and "system errors" are down, the FAA's Lavey speculated it "could be because there's less traffic."

A more complicated explanation came from ASI, to which pilots and controllers also voluntarily report air traffic incidents. "No one really knows what the level of safety is; it's an arbitrary term," Galipault observed.

Before the strike, reports to ASI came in at the rate of six to seven per day. When the strike began, the number went up to 40 per day and gradually diminished until the first two weeks in November saw only two to three per day, Galipault said. At the beginning of December the rate was approximately three per day.

"When the strike began, Patco members did a lot of the reporting," he said. "Then when they had to finally go out and get jobs, their reporting levels went down."

On the other hand, there was perhaps a decreased level of safety when the strike began because of "the instability of the system for the first three or four weeks," he added.

In addition, he claimed, at the in-

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The full CN '82 conference (80 sessions) is $395, and includes three luncheons and three evening sessions. The "Electronic Mail/Business Communications" two-day mini-conference is $245. Exhibit hours are 10:00-4:00.

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CW12/28

ception of the job action, "The majority of working controllers were told not to report anything bad — just good — about the system.

"The implication was that anything bad makes Patco look good," according to Galipault, "and if Patco comes back, you're in trouble."

Whatever the actual level of safety now, according to the *Monitor*, "Adding the certainty of bad weather, we see a reduction of the safety margin in the many months ahead."

Without the fired controllers, Secretary of Transportation Drew Lewis has estimated, the ATC system will be normalized in two to three years. Some industry observers feel it will take even longer.

Of the first wave of 144 controller trainees recruited after the strike, half failed their training — an unexplained phenomenon that happened only once before, in 1977, according to Lavey.

The second group of trainees in the five-month course had a 30% failure rate, as compared with the average of 25%. Currently, there are "less than 100" newly trained controller aides working in centers around the country and it will be two years before any of them are full-radar controllers.

Patco Files Chapter 11

Meanwhile, Patco has been decertified and in November filed for bankruptcy under Chapter 11 of the federal bankruptcy law. Nevertheless, the union insists it still exists.

"We aren't going out of business," according to a Patco spokeswoman. The bankruptcy filing "means we might be able to pay off our bills in some rational way."

Patco's bills amount to about $140 million in claims and debts, including nearly $4 million in attached assets, $130 million in damages sought by the Air Transport Association, an airline group, $1.5 million in federal contempt fines and $635,000 in legal fees.

Under Chapter 11, the applicant continues to operate with court protection against creditor lawsuits while it tries to work out a plan for paying debts. The union's financial situation has been severely hurt by its lack of dues.

Since Patco's decertification, the FAA has stopped collecting union dues from the 2,000 Patco members who kept working during the strike.

Whatever the future of Patco as it now exists, some unanswered questions remain: Will conditions improve for controllers in the future? Will their six-day work week be cut to 32 hours, as they have requested? Will they receive a better wage/benefit package? Will the FAA step up its efforts to replace the third-generation computerized ATC machinery before the projected mid-1990s deadline?

One possibly good sign for the controllers is an independent task force now studying the hiring procedures, work environment and other humanistic aspects of the ATC system. The results of the FAA-sponsored five-month study are due in mid-January.

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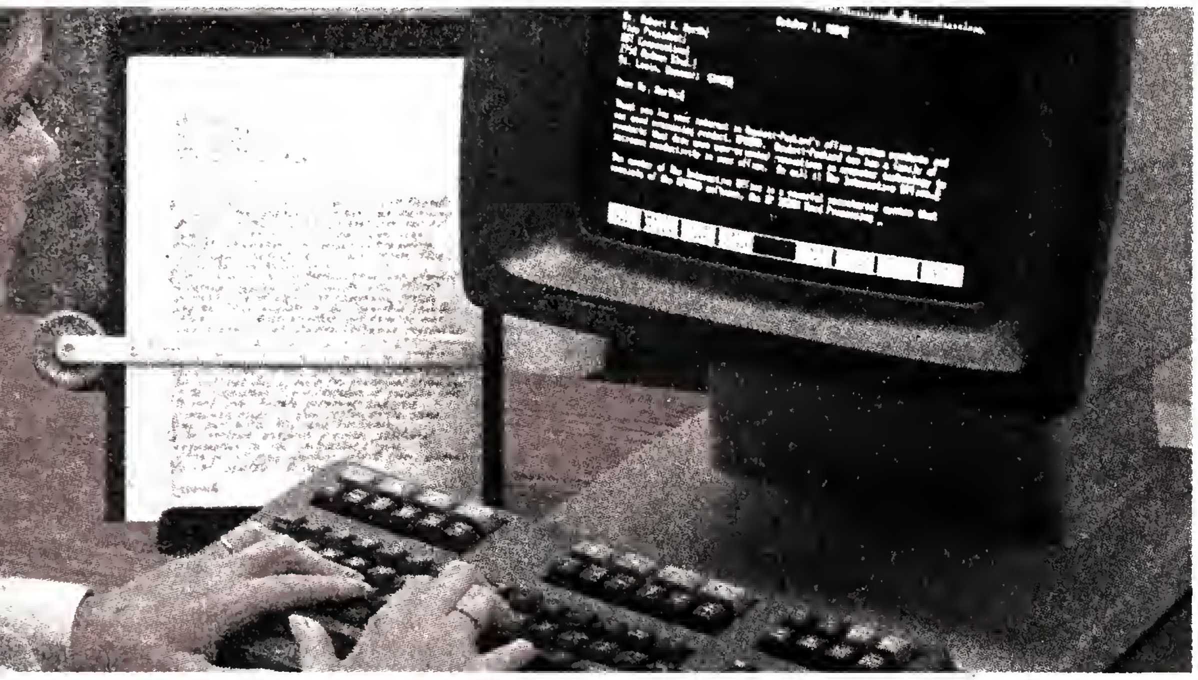

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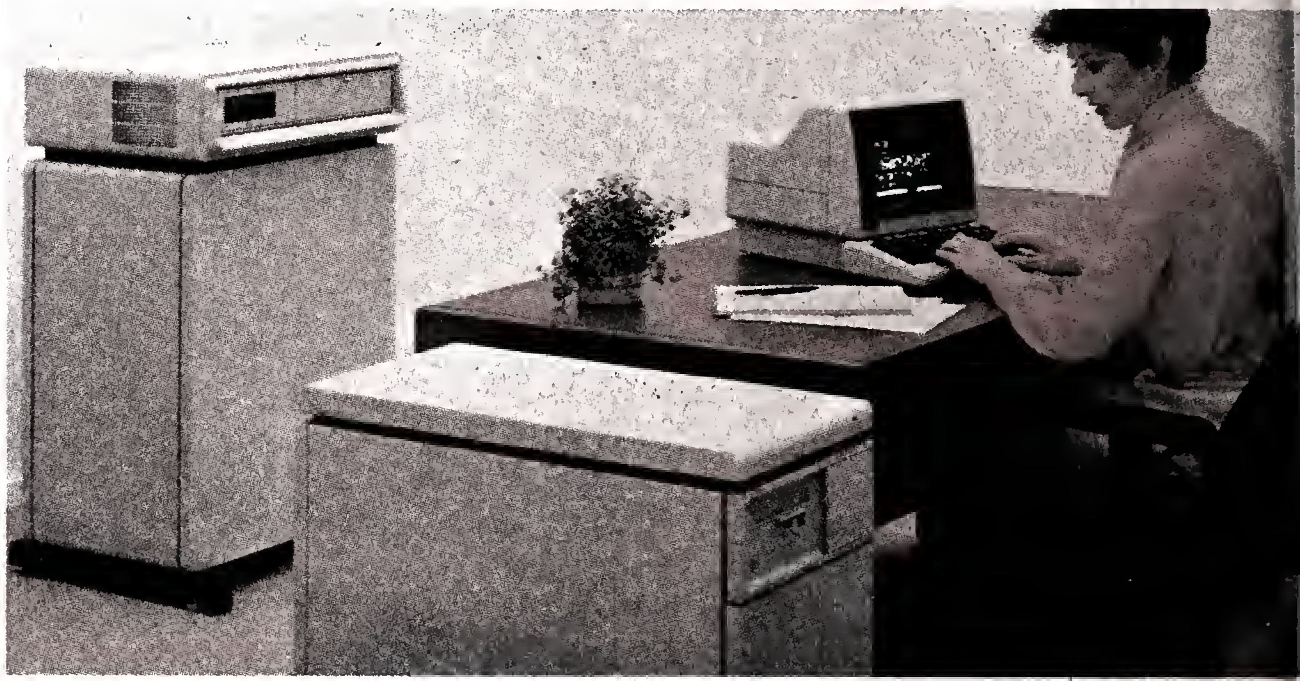

Economical computing with up to 56 terminals. That's what you get from the new HP 3000 Series 40. Use it as a central processor in a small office or as part of a network.

Electronic mail and filing for individual users will be part of the system later this year.

High-volume printing on this laser printing system virtually eliminates preprinted forms, letterhead stationery and long lines at the copier.

Data communications can expand The Interactive Office across the country or around the world.

tive Office.

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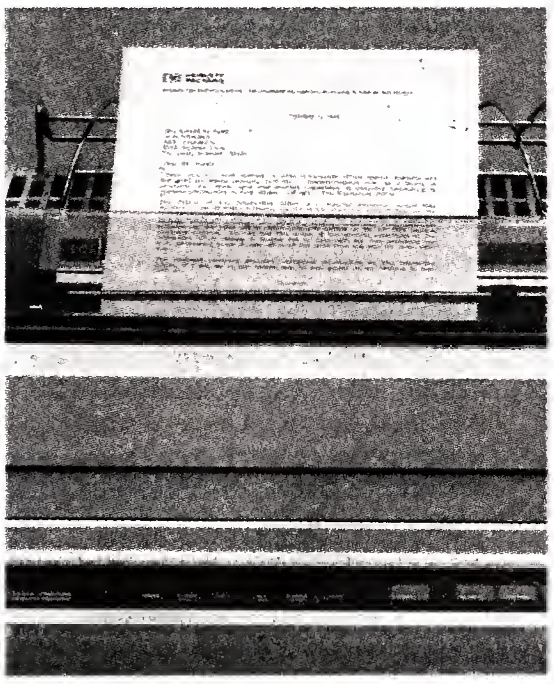
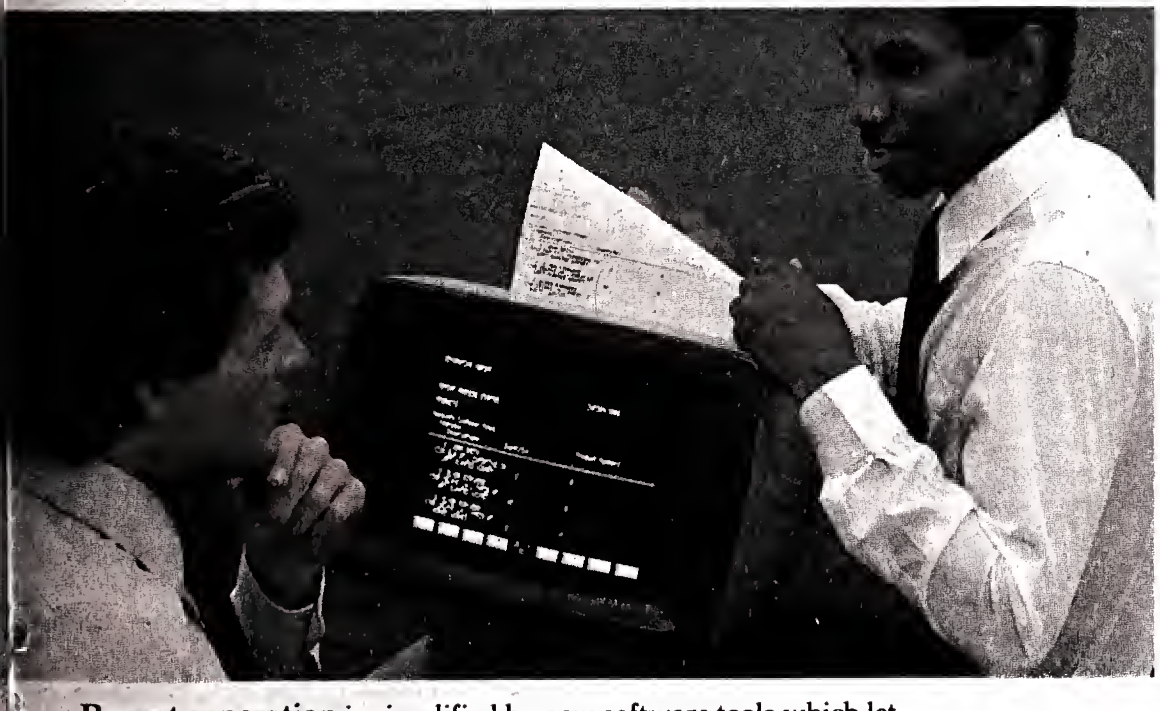
Graphics created on this low-cost terminal can be plotted on paper or transparencies.



High-quality printing for business correspondence and reports can be generated on this letter-quality printer.



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EDITORIAL

A Cloudy Crystal Ball

The one safe forecast to make about 1982 is that it will be unpredictable.

The quickening pace of technology and the diverse applications to which it can be put in business plunged the computing community into a turbulent environment that will continue in the months ahead. DP management is caught in the muddle.

Technological advances have made it impossible to separate computing and telecommunications. Ultimately that powerful new alliance will be to the advantage of users, but in the short-term, the convergence has created confusion in the minds of DPers who must come to grips with it.

One attempt to cope with it is the "information center," an approach designed to attack the ever-mounting applications backlog. The new buzzword will be heard in more and more corporate corridors in 1982, but the concept remains largely undefined and subject to personal interpretation.

Even the tidy distinctions between classes of processors are beginning to blur. The flurry of 32-bit supermini introductions is indicative of the trend: Micros resemble small-business systems; minis look more like mainframes. Every level of computing takes a step up.

DP budgets, too, will take a step up in 1982. *Computerworld's* annual budget survey, reported in this issue, found that DP budgets will rise an average 20% in 1982. Nearly half of all budget dollars will go for salaries, which themselves are projected to climb an average of 17%. Managers report three major concerns in the year ahead: salaries, turnover and recruitment. While not easy problems, these at least are familiar ones.

Finally, DP management itself is in transition, pushed from below by rampant technology and prodded from above by demands for greater effectiveness in business. Fortunately, both the computing community and the business world seem ready to embrace and develop a new profession called MIS, a function that will consolidate corporate control over information processing throughout an organization.

These and other challenges ahead are explored in this Forecast '82 issue, which, on second thought, does make one thing clear: What's needed in 1982 is not more information but better information management.

DATA PAST

Five Years Ago
Dec. 27, 1976

CHICAGO — The DP manager and a programmer at Cenco, Inc. here were charged — along with 17 others — in a $40 million fraud scheme in which the firm's computer system was allegedly used to cover the perpetrator's tracks.

Cenco inflated its inventory records in order to mislead potential stock purchases, the charges brought by the Securities and Exchange Commission in U.S. District Court here indicated.

— — —

MINNEAPOLIS — Control Data Corp. adjusted lease, purchase and maintenance prices for new orders on selected equipment. Some purchase and lease prices for large-scale Cyber 170 systems were decreased by 6% while others were increased by 6%.

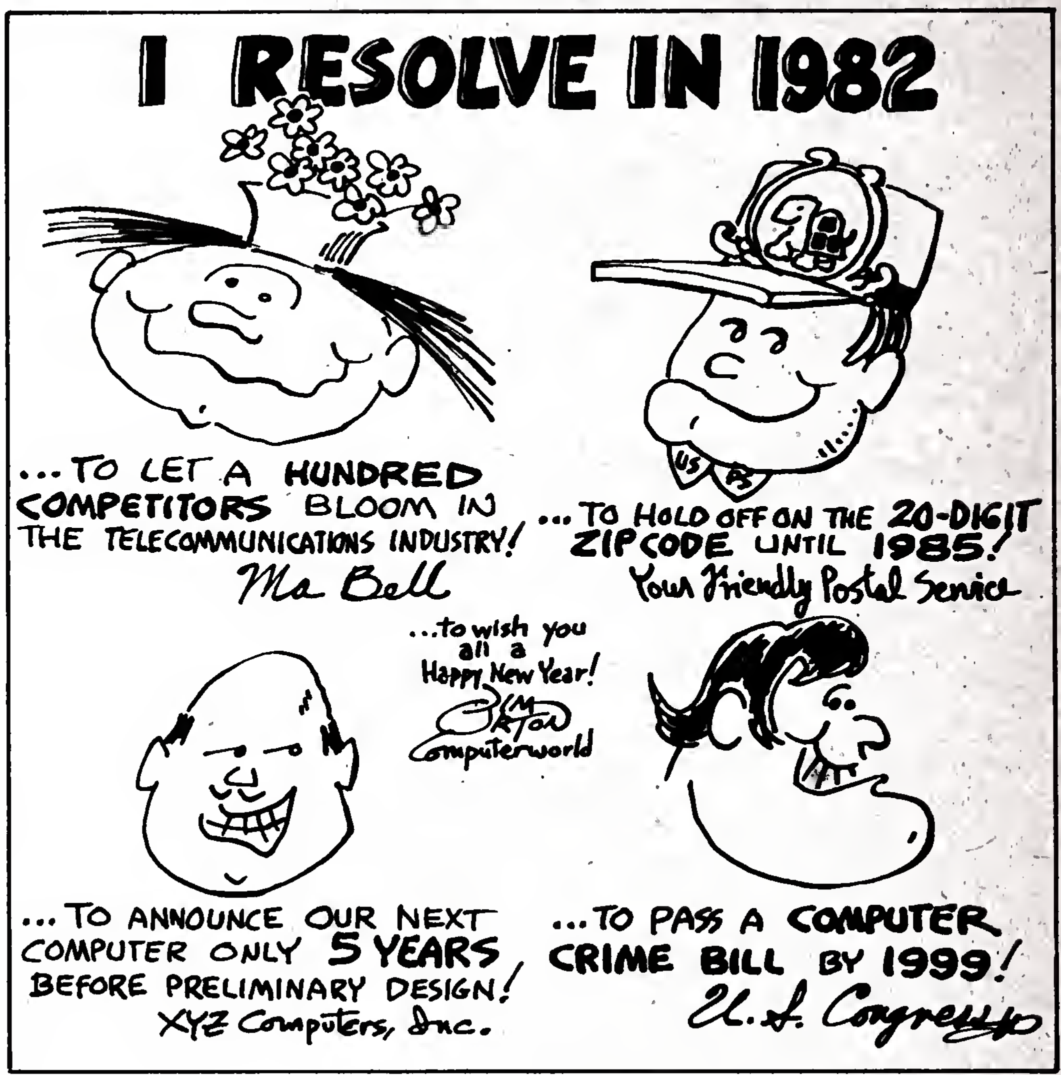
Ten Years Ago
Dec. 29, 1971

WASHINGTON, D.C. — The Federal Communications Commission (FCC) directed AT&T to justify the need for Direct Access Arrangement (DAA) interconnection devices. The DAAs were branded "discriminatory" by the Independent Data Communications Manufacturers Association.

The association, in an informal complaint to the FCC, charged the DAAs discriminated against users that provide their own modems and other noncarrier equipment.

— — —

HARRISBURG, Pa. — Most RCA users were "enthusiastic" about future relations with Sperry Univac since the company took over the RCA customer base, according to David Rau, president of the RCA User's Association.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XYZ Computers, Inc.
...TO PASS A COMPUTER CRIME BILL BY 1999!
U.S. Congress

LETTERS

Politics and 'Peter Principle'

I disagree completely with Donald Berardo's article ["What to Do When You've Been Passed Over," CW, Dec. 7].

My experience indicates that in 90% of cases in which employees have been passed over, internal politics (win-lose politics) was the underlying cause. In the remaining 10%, the "Peter Principle" was in effect.

My advice to someone who has been snubbed is to call an experienced competent executive recruiter to seek the promotion in another organization or company.

My objection with your advice is the omission of the above paragraph and your advice to "hang in there." Hanging in there *is* a career destroyer.

Individuals who are passed over when due or overdue for a promotion should take decisive action. Otherwise, Karl Marx's idea about "labor being a commodity" becomes a reality. Careers cannot be bought or sold; only made.

Robert A. Clark
Houser, Martin, Morris & Associates
Bellevue, Wash.

'60s Attitude in 1982 World

I would like to respond to the reader commentary by Camille Kostosky ["Programmers Don't Need to Communicate in English," CW, Dec. 7].

I believe that this kind of thinking fosters a 1960s attitude toward data processing in a 1982 world. It certainly shows a complete ignorance of career development goals, users in general and the main reason for having data processing in the first place.

Users and data processing go hand-in-hand. The reason for having a management information systems department is contained in its name: systems to provide timely and accurate information to corporate management. Corporate management, the ultimate user of all this collected information, seldom speaks in Cobol and unfortunately, communications between DP and management are the most vital part of the process.

Accurate, timely information that cannot be understood is of little help to anyone. Data processors, Kostosky included, have to realize that a company does not incur the expense of inhouse data processing for the sole reason to hire a DP staff and let them play with the computer. The information had better be communicated to the proper decision maker and be understood as well.

As for career development, the trend toward programmers with communications skills is overwhelming in today's market. As a personnel consultant and recruiter, most of the companies coming to me for programmer/analysts are seeking good communications skills and the ability to interface with users. This is not just a sudden fad, but a movement to get data processors involved with the company.

I have spoken with very few 25-year old programmers who desire to be 60-year old programmers.

The young programmer of today desires promotions, increased responsibility and so on. To do so requires a good communicator who can express his ideas and understand the problems of others, both technical and nontechnical.

Technical data processors and nontechnical users must realize that they are not in opposing armed camps at war, but that they are both working toward the same goal in a business environment. To be instructed not to worry about communicating in English is a large step backward in a very forward-moving industry.

Robert H. Witkoski
DP Personnel Consultant
Romac & Associates
Philadelphia, Pa.

SOFTLINE/Werner L. Frank

A Guide to Software Listings

Software is available today in a wide variety of forms, from many sources and under various terms.

It is possible to acquire ready-made software for almost every conceivable computing function, including implementation aids (languages, debuggers); utilities (library handlers, sorts); environmental systems (teleprocessing, data base management systems); operational tools (measurement, scheduling); support systems (training, testing); application programs (payroll, general ledger); and industry systems (insurance administration, production control).

Furthermore, software can be purchased to operate on large computers as well as small ones. For example, the language compiler Basic is available for operation on a mainframe, minicomputer or microcomputer.

Simple to Sophisticated

With such overwhelming ranges of offerings, one can obtain simple applications (such as recipe conversions on microprocessors) for $4.95 or sophisticated total systems (such as a life insurance administration system) for $500,000, reflecting an incredible price difference of five decimal orders of magnitude.

Software is available from either the hardware manufacturer or from independent organizations. Sales are made directly to users as well as to turnkey suppliers on an OEM basis. There are software middlemen who act as brokers for the products of others, as well as individual software entrepreneurs who may operate a mail-order business.

Industry subsectors have been established in which organizations make a living from the software products industry by providing catalogs of available software, consulting to users on how to buy software and now, even advising individuals and businesses on how to package and market their own software.

Software can be purchased or leased. It can be obtained in source code or restricted to object code. It may be available through the mail, on a trial basis, acquired on the basis of benchmarks or purchased on standard cassettes.

Software is even available in publication form through program listings printed in popular computer hobby magazines or in the form of algorithms in several Association for Computing Machinery (ACM) periodicals, including the *ACM Transactions on Mathematical Software* and the *Collected Algorithms from ACM.*

In the early 1960s, software was openly disseminated at no cost, but today this is no longer true. In return for a price, the seller provides a property well worth purchasing. The price will reflect a range of possible terms — from a product sold "as is and unsupported" to a guaranteed and maintained product with appropriate documentation, training and continued product evolution.

But how does the user find the software applicable to his requirements? For this objective one can turn to commerical sources.

The premier compendiums of computer program listings are published by International Computer Programs, Inc. (ICP), which counts more than 2,000 company suppliers and more than 10,000 products listed in a number of publications, as follows:

- *Data Processing Management:* systems software
- *Business Management:* cross-industry applications
- *Business Management:* industry-specific applications
- *Mini-Small Business Systems:* cross-industry
- *Mini-Small Business Systems:* industry-specific

In addition, ICP publishes the *Directory of Information Product and Service Suppliers,* a compendium that links company profiles together with indexes that guide one to products by market specialty, industry orientation or geographic area served. Also, a statistical summary is included for the top 100 U.S. companies providing information products and services.

ICP also produces on a quarterly basis, *Interface,* a series of six magazines aimed at the specific interests of the following user sectors: data processing management, manufacturing and engineering, insurance industry, banking industry, administration and accounting and small business management.

Each issue contains articles pertinent to software topics for the particular sector as well as listings of available software products serving that sector.

Commercial Catalogs

Other commercial catalogs of software are available. One such source is *Datapro's Directory of Software,* a listing of offerings similar to the ICP catalog. This directory comes in two volumes and includes about 6,000 listings showing offerings of manufacturers as well as independent suppliers. A convenient guide is available indicating programs available by machine and by manufacturers, of which there are more than 100 identified.

The directory also includes the "Annual User Ratings of Proprietary Software." This evaluation of software-in-practice can be a useful measure of a vendor's offerings as perceived by the user community.

Another alternative is the two-volume book, *Auerbach Computer Technology Reports,* from Auerbach Publishers, Inc. Divided by applications and systems software, the information is grouped by major subject matter so that appropriate tutorials and available software alternative solutions are readily assembled and focused on behalf of the user.

A fourth reference book for available commercial software is the *International Directory of Software* published by CUYB Publications, Inc. of Pottsdam, Penn., and England. This British organization, in its 1980-81 edition, lists more than 3,200 systems and applications software with a special emphasis on worldwide origin. The compendium is organized into 107 categories and 24 industry groups, by product names as well as suppliers.

Other foreign-based sources are the *Guide European des Products Logiciels of the Centre d' Experimentation de Progiciels* in France and the *ISIS Software Report* from the West German organization, Infratest Information Services.

An entirely new area of software availability is served by yet another publication, the *International Microcomputer Software Directory,* issued by Imprint Software of Fort Collins, Colo., and London, England. This compendium lists more than 5,000 programs, fully indexed and cross-referenced by applications, machine, operating system, vendor and name. This organization introduced a special code, the International Standard Program Number, to identify each program.

The move to recognize the newly

(Continued on Page 112)

HUMAN CONNECTION/Jack Stone

Visions of Sugarplums and Personal Computers

Now I'll wager that most of you are wizards at justifying expensive machines to your bosses and use objective, detailed and comprehensive cost analyses to do so. But in spite of all the acquisition successes at your business, I'll also bet that your cost-conscious spouse is not convinced you ought to run out and buy a personal computer.

Well, now that the holidays and the New Year are upon us and the spouse is presumably soft on gift ideas, I want to suggest some novel approaches you might employ to get the final approval.

The thought of a family doing *anything* together these days should warm the cockles of all the members' hearts. So try latching onto Apple Computer, Inc.'s theme: the "family system, the home resource for working, learning and playing," (but avoid distributing its sales literature that displays the smiling joyful papa pounding away at a microkeyboard, surrounded by the smiling, joyful mama and ruddy-faced kids, one of whom is fondling a partially-chomped Jonathon Red.

But look before you bite. Apple is pushing a rather rich configuration for home use: a 48K-byte micro with twin disks (and your own TV monitor), plus the capabilities to attach "dozens of powerful additions" and use "literally thousands of program diskettes."

'I'll also bet that your cost-conscious spouse is not convinced you ought to run out and buy a personal computer. Well, now that the holidays and the New Year are upon us and the spouse is presumably soft on gift ideas, I want to suggest some novel approaches you might employ to get the final approval.'

The base configuration comes with seven programs to start your family "inventing, discovering and enjoying in a brand new way": budget control, record filing, word processing, typing exerciser and some games. The salesman said the price list was lost in the mail.

What with IBM saturating the airwaves with advertising for its Personal Computer entry, a purely economic thrust like this one might work:

"IBM's move demonstrates that the home market is truly upon us. Now I can sit down at my machine and in only a matter of hours turn out a software product that will sell like hotcakes to IBM customers. With the extra income, we'll be able to buy a new house or take a trip around the world or send the kids to college!"

At first glance, the IBM product appears to be impressive, but then it features main storage capability up to 256K-bytes (which seems more appropriate for a Fortune 500 company than a home), a disk drive one generation behind the times (40 tracks, 40K-bytes per diskette) and word processing software controlling, of all things, a dot matrix printer.

Considering all that you get for around $400, the Radio Shack 4K-byte TRS-80 color computer is not all that shabby, particularly if you're stuck with a Reaganomic budget. Of course, you have to pay extra for software and provide your own cassette storage and TV monitor. But the good news is that kids love it, and with pressure from them, the spouse is certain to yield.

Then, after the machine arrives, kick the kids off the keyboard through the exercise of parental powers, attach the 16K-byte upgrade kit and telephone modem that you funded from lunch money holdbacks and spend *your* time creating high-resolution color graphics and following stock market quotes from the Dow Jones News/Retrieval System.

Letters to Stone should be addressed to him at Box 270, 1377 K St. N.W., Washington, D.C. 20005.

A Guide to Published Software Listings

(Continued from Page 111)

emerging microcomputer marketplace is encouraging others to provide valuable program source information. Datapro Research Corp. has announced the *Directory of Microcomputer Software*, which includes more than 2,000 entries of programs for computers costing under $40,000. The products are indexed by application, name, vendor and computer system.

There are also the software catalogs offered by the hardware vendors in support of their own equipment. Many times, these reflect solely their own offerings and sometimes such catalogs provide information regarding available third-party software. An example of the latter is the *Business Systems Software Directory* offered by Hewlett-Packard Co., which cites applications software produced by independent organizations for operation on the HP3000 series. Another example is the *Honeywell Software Catalogue* from Honeywell Information Systems, Inc.

IBM is, of course, the key software supplier among the manufacturers. The most noteworthy publication is the *Data Processing Division Software Directory: Keyword Index and Program Information*. This catalog is published annually and provides listings of more than 1,000 IBM offerings including systems control programming, program products, field-developed programs, installed user programs and programming requests for pricing quotations. These program types are further organized for look-up by a keyword index, program order number and product cluster.

Organized by Topic Areas

The IBM product cluster index organizes the available programs by seven major and 44 secondary topic areas. The major topics include two applications areas, the cross-industry and the industry orientation, with 22 further breakdowns. The remaining five categories of software are all systems-oriented, including data base/data communications systems, interactive systems, systems control for host systems, distributed systems and subsystems control.

However, the most useful publication of IBM is the *Systems and Products Guide*, published for the data processing executive and issued for the first time in 1981. In one compendium, a brief but encompassing overview is supplied of data processing concepts and systems. Key data processing functions are defined and pointers are provided to the software with which to implement or support the area.

Of even greater significance are the software roadmap and family relationships that are provided for major systems. Finally, individual products are described, indicating purpose, key functions, benefits and prerequisites and product dependencies.

A specialized version of this publication is the August 1981 *Application Development Systems Catalog*, which is a tutorial presentation of the key development environment software of IBM. Described herein are the component offerings in support of data systems, development center and information center as defined by IBM.

The IBM document, *Applications and Abstracts*, serves yet another purpose. It provides a comprehensive listing of available applications software as seen through a cross-industry view, a scientific view, and 16 industry views. For each of these 18 major areas, further categories and subcategories are defined, including references to abstracts of available software that satisfy the identified function or requirements.

Companion publications are now also becoming available from IBM that list applications software available from non-IBM sources. Two such catalogs have recently been issued that are devoted to engineering and scientific applications programs (October 1981) and insurance applications programs (April 1981).

Micros and Software

The manufacturers of microcomputers are also promoting software. In this connection, we cite the *Applications Software Sourcebook* from Radio Shack, which lists thousands of independently supplied programs available for purchase for the TRS-80 line of personal computers.

Contrast this with the *'80 Software Directory* of independent publisher Personal Micro Computers, Inc. of Mountainview, Calif., which aims for the same marketplace listing 600 suppliers and more than 7,000 programs for the TRS-80 computer line. As expected, these catalogs can be obtained at a cost substantially lower than comparable software directories aimed at the user of large computers.

Major software vendors for microcomputers are also anxious to show what might be available that is compatible with their offerings. For example, Digital Research, Inc. issues the *CP/M Compatible Software Catalog*. This document lists the names and associated product offerings for more than 100 independent software suppliers whose programs function within the standards of the CP/M operating system. The listing includes categories of software in languages, utilities, word processing, accounting and for specialized vertical markets.

(Continued on Page 114)

Everybody promises information systems that will work together in the future...

LETTERS

Basic Misunderstanding

Richard Shemtob's recent reader commentary ["Should Audit Firms Provide DP Services?" CW, Nov. 30] exhibits a basic misunderstanding of how services are provided by most large accounting firms and of the role of the Securities and Exchange Commission in monitoring independence disclosure. Additionally, the article misses the point that the consulting services offered by accounting firms are often, because of the depth and breadth of experience available, more valuable than narrowly focused data processing consulting.

In most large public accounting firms and certainly those that constitute the "Big Eight" national firms, consulting services, including those pertaining to DP-related areas, are usually performed by a staff separate from the auditors.

In most cases, the consultants are not even CPAs, but are instead, as Shemtob himself points out, simply "DP personnel with superior people skills and communicative abilities." Indeed, they are hired by the accounting firms precisely because they are experts in their field who bring impressive credentials and experience to the practice.

If, as Shemtob points out, "the guiding principle for evaluating the appropriateness of DP services from audit firms is the determination of how auditors become DP experts as well," then the answer is simple. The auditors do not become experts themselves, but instead make available extremely well-qualified experts who are specialists in nonaudit fields and who are integrated into the same practice to offer a full range of services with the highest level of continuity possible.

It is true that consulting engagements often arise out of an existing relationship established through the audit portion of the firm. However, a clear distinction is always made between the formal audit and any consulting services provided. The full range of services available from the accounting firm is a strength, not a weakness. The integrated approach to client service ensures that all the business objectives of the client are taken into account, not just the isolated DP needs.

One of the real advantages of general management consulting through an accounting firm is that the orientation is toward solving the problem, not just implementing another system. We are free to find solutions that might ultimately lead away from DP because we have no vested interest in a computer solution.

It is a fact that large and serious failures in systems implementation, such as the one referred to in the article, do still occur. Success or failure in implementing systems comes from expertise and discipline. These are present in abundance in today's full-service accounting firm.

Irwin L. Goverman
Senior Consultant
Touche Ross & Co.
Los Angeles, Calif.

Predictable Posture

In reference to Richard Shemtob's reader commentary ["Should Audit Firms Provide DP Services?" CW, Nov. 30], I have always marvelled at the predictability of the posture such an article would take. I say "posture" because it appears to be a slanted article except for the grudging admission in the last paragraph that perhaps not all such engagements are disasters.

It seems that auditors, as a class, extol the advantages (and there may be many) accompanying their services for systems work to a client. Those in the adversary role (consultants, data processing types and so on), remonstrate because of the disadvantages (and there may be many) of a system designed by an impure data processing team "tainted" by other disciplines.

The truth lies somewhere in between and has very little to do with the firm providing the services and almost everything to do with the specific personnel involved. In this, Shemtob's last paragraph contains an axiom: "Fine work usually is the product of fine minds and good people."

As a CPA and a partner in charge of management services of a regional CPA firm, I am sadly aware of the shortcomings of systems design by both types — auditors and data processing people — because they do not straddle both data processing and auditing disciplines. Such cross-pollination does not result in an inferior systems person, but rather produces someone better adapted to systems development.

It is true that systems designed by auditors have sometimes lacked refinements and even fundamentals of good systems design. It is also true that the systems person sometimes does not begin to grasp the significance of audit trails and controls and at times has also been guilty of missing the refinements and fundamentals.

The real issue is the burgeoning market for these services. And since there is no quality-control watchdog, it is the clients who pay in many different kinds of coin whenever the systems person errs, regardless of the systems person's discipline affiliation. Only the conscience of our individual professionalism can protect them. Ultimately, the less competent among us will damage the DP professionals and auditors' reputations collectively.

Bernard D. Shevach
Brout & Co.
New York, N.Y.

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SYSTEMS THAT WORK TOGETHER NOW

LETTERS

Three Laws

Having inherited a few-score undocumented applications, I was attracted to the reader commentary by Edmond Weiss ["Five Laws of User Documentation," CW, Dec. 7]. We have long used only three laws:

1. Give it to them when they need it.
2. Give it to them where they need it.
3. Give them exactly what they need.

There is only one way to do this effectively and that is to build documentation into your system. Make error messages understandable — (include error numbers for precise identification). Make every prompt honor a request for help (don't forget lowercase keyboards). Every time you receive a call for help on the telephone, ask them if they have asked the computer first.

Now instrument your system so you can measure its effectiveness. You wouldn't drive a car without a speedometer. Why write documentation without knowing if it works?

Build in a function that will log the conversation so you can look at it. Ours are sent to a print file. You will be surprised at what you will learn about the effectiveness of your prose. (You might even catch a thief!)

All this is possible — presuming, of course, that you are using a modern, on-line interactive system.

John Beckett
Director of Computer Services
Southern Missionary College
Collegedale, Tenn.

Offers Advice

I would like to add a few thoughts to the excellent reader commentary by Edmond Weiss ["Five Laws of User Documentation," CW, Dec. 7].

The best advice I ever got on the subject was to "assume you are talking to an idiot when you write user documentation." What this actually means is that if you take the trouble to be clear, complete and orderly, you will avoid being the idiot when users find your documentation unworkable.

The most common pitfall is to assume that the user must have certain knowledge with which you don't have to concern yourself.

One of the greatest sins you can commit is the casual insertion of duplicated procedural references like, "see page 13, section A, steps one thru six." If it is too much trouble to rewrite those steps and save the user the back-and-forth effort required by your shortcuts, you should not be involved in the creation of user documentation.

User documentation should be viewed as an intellectual challenge that provides you with an opportunity to exhibit some reasonable level of communications expertise. If your finished product gives you the feeling of assurance that the document(s) are really an extension of yourself — eliminating the need for further clarification to the user — you've done the job properly.

E.J. Kissner
Director of Management Systems
Lenox Hill Hospital
New York, N.Y.

A Guide To Software

(Continued from Page 112)

Finally, we cite the role of the U.S. government in recognizing software as a public asset. Two major sources of publicly developed software have emerged.

One is the Technology Utilization Office of the National Aeronautics and Space Administration, which distributes more than 1,500 programs through its Computer Software Management and Information Center operated by the University of Georgia.

A complete catalog on microfiche or printable magnetic tape can be purchased that has keyword and subject indexes as well as program descriptions.

Prices range from several hundred dollars to several thousand dollars per program.

Second Source

A second source is the Department of Commerce's National Technical Information Service (NTIS), which makes available government-developed software at prices ranging from $100 to $1,000. A very complete information list is available from NTIS's Office of Data Base Services. Publications of NTIS relating to software include:

- *Directory of Computerized Data Files and Related Technical Reports.* This includes more than 400 data banks and software programs covering more than 45 subject catalogs.
- *Directory of Federal Statistical Data Files.* This publication identifies significant data files of statistical data accumulated and published by the federal government.
- *Directory of Computer Software and Related Technical Reports.* This comprises a list of more than 350 programs and related reports covering 27 subject categories.
- *Catalog of Directories of Computer Software Applications.* Descriptions of available documentation and/or source programs for more than 25 subject areas.
- *Computer Control and Information Theory.* This bulletin service lists abstracts of recently available software- and hardware-related reports and devices.

Frank is executive vice-president of Informatics, Inc. in Woodland Hills, Calif.

COMMUNICATIONS

Computerworld Extra! takes a second in-depth look at communications in its first issue in 1982.

In 1982, *Computerworld* will be producing three issues of our popular "tabazine" publication, *Computerworld Extra!* Each issue will provide in-depth coverage of a single, important topic and we'll be kicking off '82 with another broad and detailed look at data communications.

Communications will ultimately define how computers are used in the 1980's and nothing in the industry will go unaffected by this rapidly changing technology. In "The Changing Technologies of Data Communications," you'll read invited articles by recognized industry experts on these important current topics:

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- *Who's the new competition for AT&T in the 80's?*
- *What is Bell's strategy for the next decade?*
- *What's the role of dumb and intelligent terminals in the new communication systems?*
- *Video and cable communication in data processing.*
- *Satellites — what are the new communication opportunities?*
- *Packet switching.*
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- *Digital termination systems.*

And for those of you who are consultants, this *CW Extra!* has something extra for you because we're addressing such important management issues as:

- *Local and longhall network management.*
- *Financial data transmission management.*
- *Personnel communication management.*
- *Managing the communication enterprise and coping with government regulations.*

Computerworld Extra! will be read by more than 114,000 paid subscribers (ABC 6/30/81) and more than 450,000 pass-along readers (Becker Research Corporation). These readers include the Vice Presidents, Directors, DP Managers, and other MIS professionals who are responsible for the vast majority of all the data processing management/information systems in America. They are the decision makers for nearly $2 billion in annual expenditures on communications, and they rank *Computerworld* as the most useful publication they receive — by more than 4 to 1 (Becker Research Corporation).

CW Extra! advertising close is February 5 and we'd be glad to give you more advertising information — as well as complete details on our subscribers and readers. Just contact your local *Computerworld* Sales Office, or, call Frank Collins, Display Advertising Manager, CW Communications/Inc. at (800) 343-6474.

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Marketplace Growing 20% Annually

Survey: Financial Modeling Embraced

By Lois Paul
CW Staff

MINNEAPOLIS — The financial modeling marketplace is growing and revenues for these software products will continue to increase between 11% and 20% per year.

These are some of the findings of Info-Dyne, Inc.'s recently published "Multi-Client Study on Financial Modeling."

Of the users responding to Info-Dyne's questionnaire for this survey, 61% reported they have been using their current modeling languages since 1977. Only 29% had implemented modeling products between 1969 and 1975.

Another survey finding is that user loyalty to financial modeling packages is increasing. Of those surveyed, 78% previously had switched modeling products at least once and 39% had switched at least three times. However, only 22% reported plans to switch again.

Overall, users reported satisfaction with the technical features of their products. Consolidation capability ranked highest in satisfaction, according to Info-Dyne. Users were least satisfied with their products' ability to interface with other packages and with graphing/plotting capabilities.

A frequently mentioned point, according to the surveyors, was the importance of the support of top-level corporate management and their understanding of the firm's modeling projects. "Without executive support and involvement, the modeling project is more likely to be unsuccessful."

The report also indicated that the dominance of larger companies in the use of modeling is beginning to diminish. "The increased capabilities of modeling products have made them more feasible for smaller companies."

The users that were surveyed represented a wide cross section in size of companies represented, according to Info-Dyne. The users noted their DP annual budget growth typically is in the range of 11% to 20%.

The majority of the users (73%) are looking for technical capabilities first when selecting a modeling product, the survey revealed. Maintenance updates were considered crucial by 48% of the users. Cost was considered "crucial" by 14% and "important" by 62% of the users.

Ease of Use

Ease of use was the chief technical factor users were looking for when choosing packages, the surveyors reported. Other factors were mathematical operators, flexible report writers, consolidation capability, data input and editing and updating ability.

No serious implementation problems were reported. The majority (70%) indicated they planned no change in the user of their modeling product, Info-Dyne continued. An additional 17% planned to upgrade their product, 9% planned to replace their product and 4% planned to go in-house.

Most of the survey respondents said they have used at least one modeling product and some reported using as many as four. The majority used an in-house model rather than one supplied by a remote computing-services vendor. The majority of users said they were heavily involved in both the evaluation and implementation of their financial modeling applications.

The most frequently used application for the modeling packages was budgeting, according to the surveyors, followed by corporate modeling and the related areas of cash-flow projections and the creation of financial statements.

Most of the modeling applications were stand-alone, they noted, although some users reported an increasing interface with data bases and data base management systems and with accounting data and software.

Users reported a preference for buying a modeling product and running it in-house or using a package with an outside services vendor first and eventually bringing the model in-house, Info-Dyne said. The least preferred approach was to hire an outside consultant to develop a model.

The users preferred in-house packages because of low cost, they reported. Although the average installation cost of a product was higher for in-house users ($34,000) than for remote computing-services users ($8,000), the average annual operating cost was less for in-house users ($4,000) than for remote computing-services users($8,000).

Users generally used their own staff to research their needs for modeling packages, the survey indicated. They ranked better documentation as the most important factor that would make their evaluation of products less costly and time-consuming. Also considered important was marketing material that would interest top management, as well as additional case histories.

Info-Dyne in located at 1700 W. 78th St., Minneapolis, Minn. 55423.

'Forces of Free Enterprise, Darwinism' At Work in Unix Look-Alike Development

CAMBRIDGE, Mass. — Although compatibility and standards remain problem areas, "the forces of free enterprise and Darwinism" are at work in the development of Unix look-alike systems.

Hundreds are trying to develop software, and from this many good systems will result, according to Robert Fabry, a professor at the University of California at Berkeley and keynote speaker at the recent Fourth General Conference and Exposition of the Unix /Usr/Group here.

The two-day conference drew about 425 registrants and featured 22 exhibits. Attendance was split about 50:50 between vendors and users of either Western Electric's Unix operating system or other vendors' look-alike Unix systems, according to Marleen Martin from 3 Com Corp., vice-president of the /Usr/Group.

Revolution Starting

"I think what you are seeing here is the beginning of the biggest revolution to hit computers in 20 years," Fabry said. "I think it is the availability of an operating system that can be moved easily from one piece of hardware to another," Fabry said.

"We have been in a world of terrible incompatibility," he continued, noting that this has been an "expensive world. Good applications programs have to be redesigned for every operating system.

"In years to come, we will look back to Unix as providing the same basics for cooperation as the first Fortran compiler did," Fabry predicted, adding, "The Unix operating system will become increasingly dominant in the next five to 10 years," and will bring with it a change in the structure of developing programs and in computing in general.

There are two clear hardware directions for Unix software, Fabry noted. The first involves personal workstations "that have the capability of a VAX right now." Unix traditionally has run on machines without a lot of

(Continued on Page 116)

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Vsam Space Analyzed

BOSTON — Advanced Information Management, Inc. has announced a package that analyzes physical space available in IBM Vsam files.

Called the CI/Analyzer, the package runs in a batch mode against any Vsam file and produces both detail and summary level reports, the vendor said.

The package costs $249, from 20 Kilby St., Boston, Mass. 02109.

Rapidata Enhances Financial Data Base

FAIRFIELD, N.J. — Rapidata, Inc. announced here that it has enhanced the Telerate II Historical Domestic Data Base that is available on its remote access computer network.

The Telerate II data base was designed to provide current and historical information on U.S. money market instruments, government and agency securities, financial and commodity futures and Federal Reserve statistics.

The enhancements are said to increase the time series in the data base to 9,000, which is triple the original size. Among the changes are an increase of the number of Federal Reserve statistics to 200, the number of economic indicators to 20, and the addition of four years of historical data on commodity futures. Commodity data is now continuous from January 1977, the vendor said.

According to Rapidata, there is no increase in cost to the user of the Telerate II data base. The monthly subscription fee of $100 remains the same. Rapidata's corporate headquarters are at 20 New Dutch Lane, Fairfield, N.J. 07006.

Two Economic Data Bases Run On I.P. Sharp's T/S Network

TORONTO — I.P. Sharp Associates is offering two new economic data bases on its time-sharing system. Business International Corp.'s BI/Data and the Organization for Economic Cooperation and Development (OECD) data base are now available.

The BI/Data historical data base is a collection of economic and demographic data for more than 130 countries with 14,000 time series in all. The earliest data collected is for 1960. It covers such areas as demographic data, national income, gross domestic product and private consumption expenditure.

The OECD data base covers the domestic economic data describing the economies of its 25 member countries with about 20,000 time series. There are four main sets of data: main economic indicators, quarterly national accounts, annual national accounts-volume 1 and annual national accounts-volume 2.

The price for use of the data bases is based on computer time used, I.P. Sharp said from 1200 First Federal Plaza, Rochester, N.Y. 14614.

'Darwinism' In Unix Systems

(Continued from Page 115)

horsepower, he continued. The Digital Equipment Corp. VAX-11/780 is the biggest machine in widespread use. However, Unix is also available for Amdahl Corp.'s largest mainframe.

There is a strong need for more computer horsepower in Unix systems, he said, hinting that future development efforts will be moving in this direction.

The kind of Unix applications that users are looking for in the future are data base systems and data management, Fabry said. Users need the capability to store data reliably, handle synchronous updates and pull data from various sites for reports. "That is not quite possible today, but I think we will be seeing it in a couple of years."

Fabry noted Western Electric's recent announcement about System 3 — its new version of Unix — and the changed licensing agreements that it encompasses. He said that previously there has been no binary license arrangement for Unix on the DEC VAX.

The major points of the System 3 announcement reportedly include the combination of Version 7 of Unix and the Programmer's Workbench into a single system and a source code license price increase to $43,000. Full technical details of the System 3 announcement have not yet been released.

Will users be able to obtain Berkeley software and other look-alike Unix products with System 3 licenses? Fabry said he has been told the answer is "yes" and he is awaiting a letter to that effect from Western Electric within the next few weeks.

ABC Automates Spread Sheets

ROCKVILLE, Md. — A software system designed to automate accounting spread sheets is available from ABC Management Systems, Inc. through General Electric Information Services Co.

The IBM-compatible ABC system produces financial reports, forecasts, budgets, consolidations, marketing reports, corporate models and capital investment analyses and other reports that typically begin with spread sheet entries, the vendor said.

Business and financial data stored in a user's in-house IBM systems were designed to interface with the ABC system, which is programmed to handle everything from simple arithmetic calculations to Monte Carlo simulation and triple exponential smoothing, according to the vendor.

More information is available from Geisco at 401 N. Washington St., Rockville, Md. 29850.

Airline Guide Goes On-Line

SILVER SPRING, Md. — The "Official Airline Guide" is now available on-line to users of Dialcom, Inc.'s computer services.

The data base consists of 700,000 direct and connecting flight schedules for 625 airlines worldwide, serving 105,000 pairs of cities.

The information supplied includes departure and arrival times, type of aircraft, meal service, stops en route, class of service and more. Fare information will become available in early 1982. In the future, the system will include hotel/motel, restaurant, rental car and other ground transportation information, according to the vendor.

Dialcom is based at Suite 410, 1109 Spring St., Silver Spring, Md. 20910.

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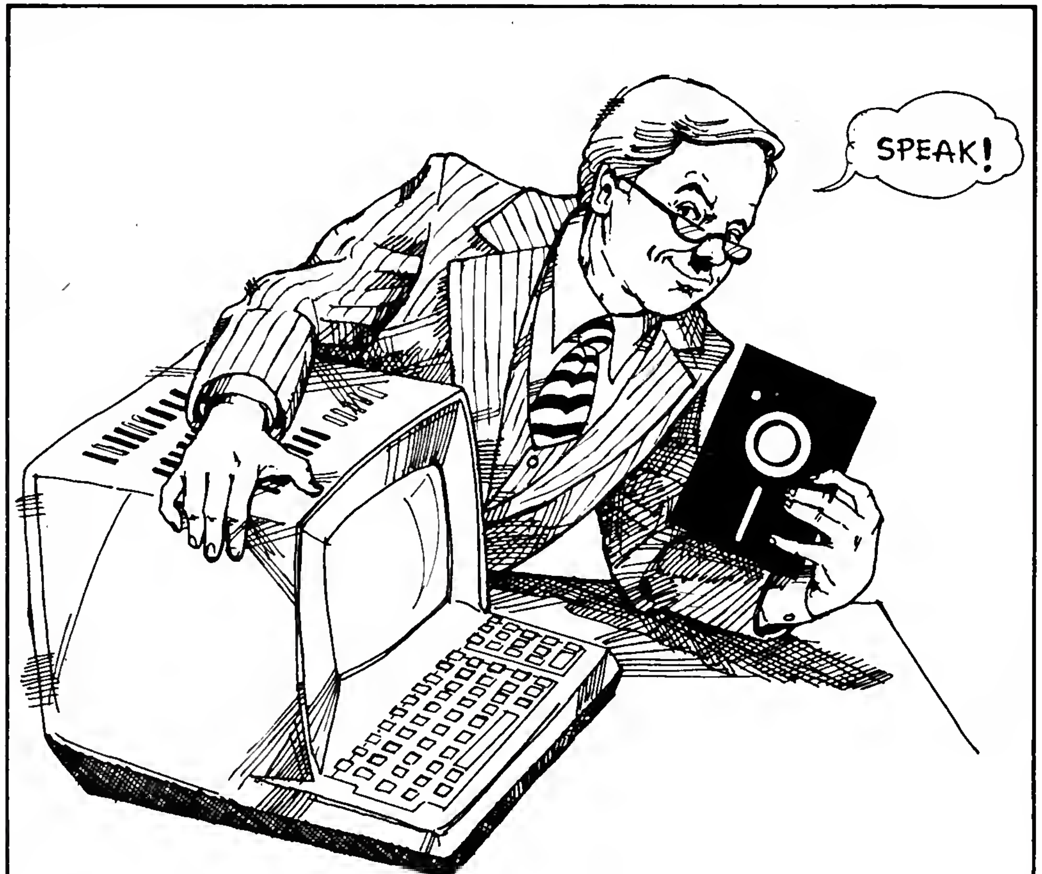

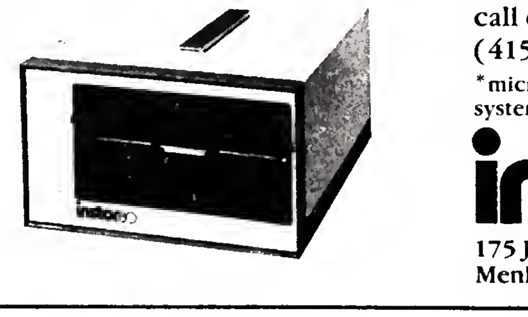

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Intel System 2000 Users Offered Graphics Option

AUSTIN, Texas — Intel Corp. has announced a graphics option for its System 2000 data base management system.

Called Tell-A-Graf, the package allows users to represent their data pictorially as bar charts, pie charts, plots and tabular and text reports, the vendor said. The package is produced by Issco Graphics in San Diego.

Graphs reportedly can be modified without having to repeat data access. For example, some data can be extracted and displayed as a bar chart without having to reaccess the data base itself, according to the vendor.

The graphics capability is an enhancement to Intel's recently announced Genius package, a report writer for System 2000 data bases.

The Genius package with the graphics option costs $20,000, Intel said from 12675 Research Blvd., P.O. Box 9968, Austin, Texas 78766.

Nasa's Cosmic Offers DBMS, Analysis Tool

ATHENS, Ga. — The software clearinghouse for the National Aeronautics and Space Administration (Nasa) has announced a data base management system (DBMS) and a configuration analysis tool.

Offered by the Computer Software Management and Information Center (Cosmic), located within the University of Georga's Office of Computing, the DBMS is called the Software Engineering Laboratory Data Base Management System (SEL/Dbam). The package creates, stores, restores and updates data, according to the vendor.

Interactive update programs can be part of four groups: data base summary and header files, complex data files, simple data files and special data files.

The update activities are divided into three modes: add new records, change existing records and delete existing records, the organization said.

The SEL/Dbam package costs $2,400 plus $23 for documentation, according to Cosmic.

Analysis Tool

Also available is a configuration analysis tool (CAT) that was developed by Nasa Goddard Space Flight Center.

The interactive program accepts, organizes and stores information pertinent to a specific phase of a project. The package is menu-driven and various report histories can be generated in response to user queries, the vendor said.

The package costs $810 and documentation costs $47.50. More information is available from the Computer Software Management and Information Center, which is located at Suite 112, Barrow Hall, Athens, Ga. 30602.

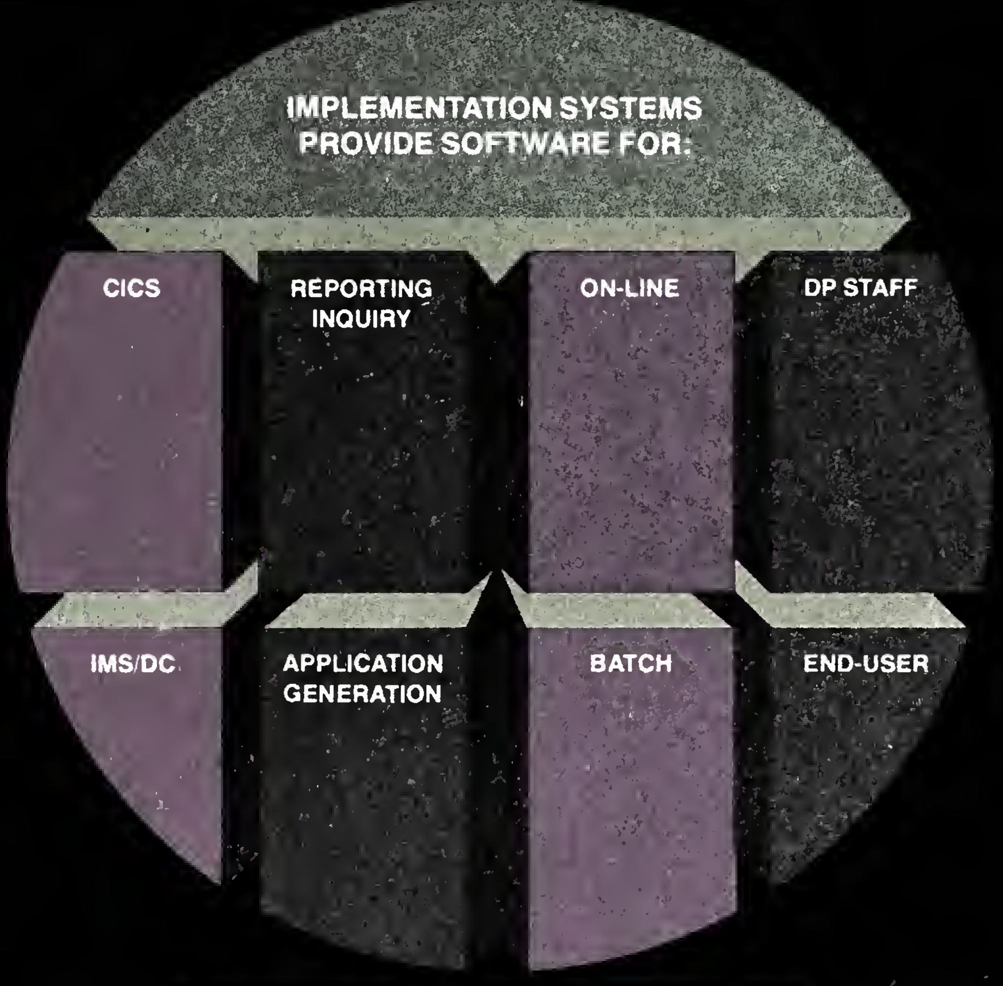
LBMS Structured Design Methodology Updated for Mathematica, Intel DBMS

HOUSTON — Learmonth & Burchett Management Systems, Inc. (LBMS) announced an enhanced version of its LBMS Structured Database Design methodology which reportedly includes rules for both Mathematica, Inc.'s Ramis and Intel Corp.'s System/2000 data base management systems (DBMS).

The methodology was designed to step a designer from the logical to the physical data base design, the vendor said. The new rules enable a working "first cut" physical design to be generated as soon as the logical design phase is complete. A further set of rules supports the process of optimizing the first cut design.

The LBMS methodology is taught via a class held by the vendor. An in-house, three-day class at the client's site is available for 20 students for $7,500.

Public classes also are offered; registration costs $900 per delegate, Learmonth & Burchett said from Suite 320, Dresser Tower, 601 Jefferson, Houston, Texas 77002.



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Support Tool Out for RSTS/E

ELM GROVE, Wis. — McHugh, Freeman & Associates, Inc. has announced KBMaster, a remote interactive training and support tool for Digital Equipment Corp.'s RSTS/E operating system.

The package was designed as an educational tool for system support managers. Managers can monitor keystroke activity at local remote sites — with instructions or corrections immediately supplied by the monitoring terminal — make the corrections or give a demonstration of the proper entry methods , the vendor said.

A single CPU license costs $500, the firm said from 1135 Legion Drive, Elm Grove, Wis. 53122.

DEC Users Get Keypunch Utility

BURLINGTON, Mass. — Interactive Systems, Inc. has announced a Keypunch Simulation Utility for users of Digital Equipment Corp.'s VAX-11 superminis and Decsystem-10 and Decsystem-20 processors.

The utility is said to simulate operation of a traditional keypunch machine on a CRT terminal while directing its output to disk, the vendor said.

Usable on "a wide variety of video terminals," according to the vendor, the product costs $3,000.

Interactive Systems is based at 131 Middlesex Tnpk., Burlington, Mass. 01803.

Fast Disk Directory 'RDR' Out for RSTS/E Version 7.0

LOS ALAMITOS, Calif. — Software Techniques, Inc. announced the release of RDR, which it described as a fast disk directory "reorder" utility for users of Digital Equipment Corp.'s RSTS/E Version 7.0.

Periodic use of RDR is said to improve overall system performance by reducing the number of disk accesses required to find and retrieve files.

RDR was designed to replace the DEC-supplied Reordr program, the 'RDR' vendor said. Written in Macro-11, RDR's features include high speed; the capability to reorder the disk master file directory extended directory sort options; comprehensive documentation; and the ability to reorder dismounted disks to prevent directory damage. RDR is available from Software Techniques, Inc. for $150. The RDR User's Guide alone is available for $30, the vendor said from Suite 101, 5242 Katella Ave., Los Alamitos, Calif. 90720.

'CLE' Designed For VAX-11s

BOSTON — Andrew Rubel & Associates, Inc. announced Command Line Editor (CLE), designed for the correction of interactive commands on the Digital Equipment Corp. VAX-11 supermini.

CLE reportedly also customizes terminal keys, creates "one-button" commands and keeps a log file of all commands issued. The user defines terminal keys, and table-driven software is used to assign a help text as well as defining the "one-button" command. Commands may be assigned interactively or remain each time the user logs in, the vendor said.

The single CPU license fee is $1,050 and includes binaries, media, shipping and handling, documentation and support for six months, the vendor said from One Soldiers Field Park 605, Boston, Mass. 02163.

'Maps' Now Ready In Packaged Form

PALO ALTO, Calif. — Ross Systems, Inc. is offering its Maps financial decision support software in a packaged form.

Available to users of Digital Equipment Corp.'s RSTS/E and VMS operating systems, Maps permits users to construct financial models, consolidations, budgets, financial analyses and financial statements, the vendor said.

Formerly offered only as a timesharing product, the package is now available as licensed software. The basic system costs $20,000, the firm said from Suite 208, 1900 Embarcadero, Palo Alto, Calif. 94303.

Cross-Compiler Out For VAX-11 Line

SAN DIEGO — A cross-compiler system said to execute on the Digital Equipment Corp. VAX-11 family of processors running under the Unix operating system and to generate object code for the Motorola, Inc. MC68000 microprocessor has been announced by Alcyon Corp.

The c68vx is an extension of the firm's c68 cross-compiler that runs on PDP-11 processors.

The price for a single CPU binary license is $950 from 8474 Commerce Ave., San Diego, Calif. 92121.

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Random Notes

Accounting Package Designed for Mini Users

ARLINGTON, Va. — An accounting software package for minicomputer users has been announced by KDK Enterprises, Inc.

Gaap includes general ledger, accounts payable, accounts receivable and payroll interface. Menu-driven, Gaap carries full warranty, documentation and built-in security features.

The Gaap package costs $10,000 with free upgrades for one year. The firm is located at Suite 302, 1491 Chain Bridge Road, McLean, Va. 22101.

Financial Package Runs on Qantel Systems

LIVONIA, Mich. — Associated Computer Management Specialists, Inc. (ACMSI) has announced a job cost financial software package for use on Qantel Corp. computer systems.

Scout includes the following modules, each of which is broken up into submodules that reportedly can run alone: payroll, $6,000; accounts payable, $4,000; general ledger, $2,000; estimating, $6,500; inventory and warehouse transfer and release, $4,500; and accounts receivable, $4,000.

ACMSI is located at 34201 W. Seven Mile Road, Livonia, Mich. 48152.

Print Spooler Out For Honeywell Mini

PHOENIX — Independent Computer Systems, Inc. has announced a print spooler for the Honeywell, Inc. Level 6/DPS 6 minicomputer.

The product offers the capability to supervise up to 100 devices simultaneously. Functions include forward and back spacing of reports, job order selection and device printing selection, the vendor said.

The product costs $2,500, the firm said from Suite 106, 8686 N. Central, Phoenix, Ariz. 85020.

Program System Controller Enhances Best System

WESTVILLE, N.J. — Prestige Software Analysts, Inc. has announced the Program System Controller, an enhancement to the firm's Best operating system for Qantel Corp. processors.

Features of the enhancement include job-stream control, batch control, menu flexibility and enhanced background partitioning, the vendor said.

The Program System Controller costs $2,250, the vendor said from 209 Harvard Ave., Westville, N.J. 08093.

'Pretty Print' Lists Programs on Diskette

SHAWNEE, Kan. — Program-listing software for the IBM System/23 is available from R.A. Long & Associates, Inc.

Pretty Print will list any or all programs on a diskette, provide a table of contents listed in alphabetical order, print in a numbered page format with page headings and tailings and resave and reassemble each program while printing.

The program-listing program costs $48.96 from R.A. Long at Shawnee Professional Building, 10820 W. 64th St., Shawnee, Kan. 66203.

Package Offers Support For IBM Series/1 CPU

DALLAS — I-Concepts, Inc. has announced enhanced support for its report writer/query package for IBM's Series/1 processor.

The package offers support for IBM 3101, 4978 and 4979 terminals. Other features include support for multiple printers, control breaks and optional record selection. Automatic features include report and column heading and date centering, the vendor said.

The package runs on IBM's EDX operating system Releases 1, 2 and 3 and costs between $1,250 and $1,950, an I-Concepts spokesman said from Suite 28, 2560 Royal Lane, Dallas, Texas 75229.

Data Entry Package Out For Harris 1600 Users

DALLAS — Harris Corp.'s Data Communications Division has announced Keyplus, a software enhancement for its 1600 line of distributed processors.

The formatted data entry package features conditional logic and branching, extended accumulator processing and ineligible field indication, the vendor said.

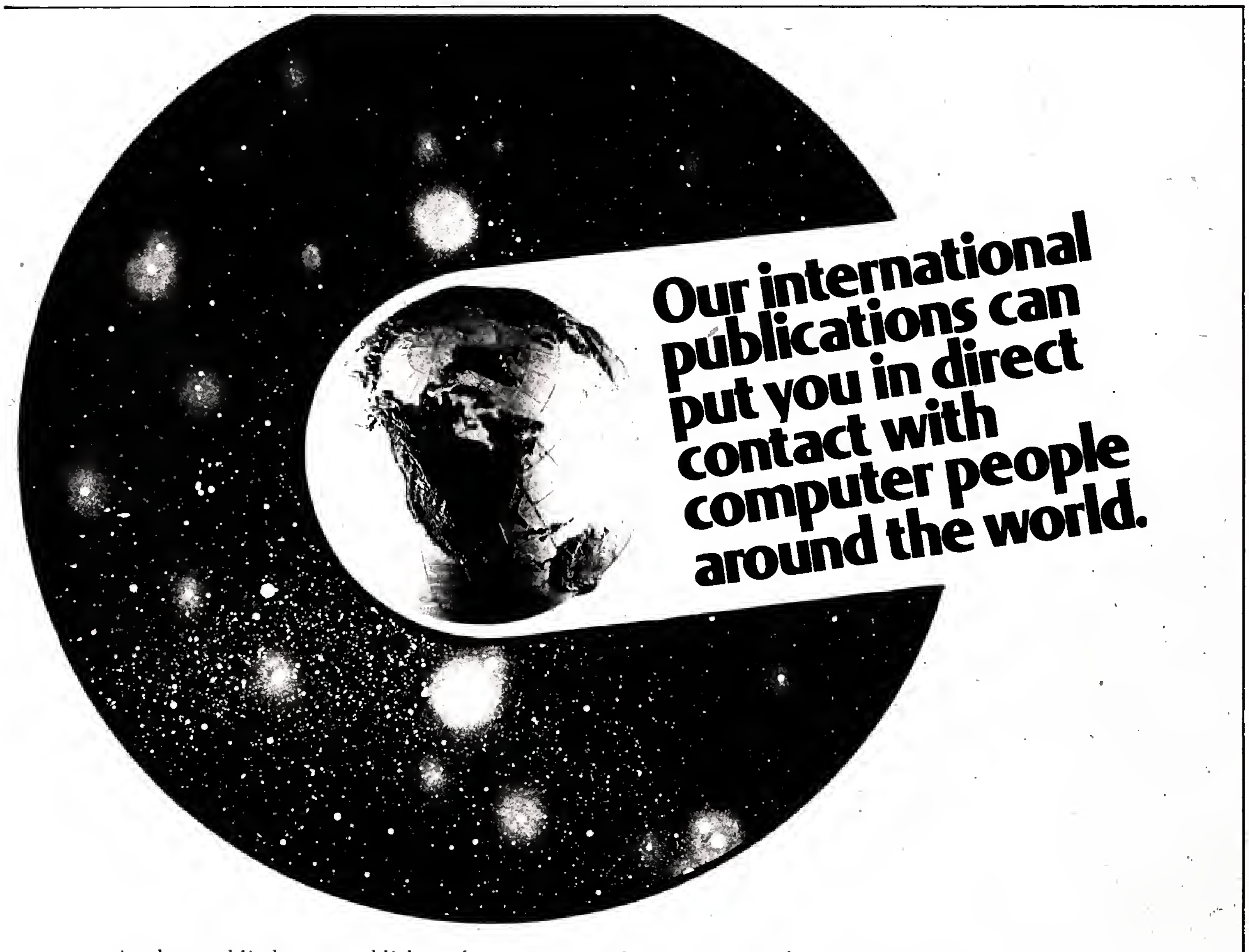
The package costs $2,860 or $65/mo on a one-year agreement, the vendor said from 16001 Dallas Pkwy., P.O. Box 400010, Dallas, Texas 75240.

Version 2.0 Introduced For IBM System/34 Monitor

HOUSTON — Business Software Services, Inc. has introduced Version 2.0 of its IBM System/34 Interactive Debugging Monitor (IDM).

The additions to the firm's already introduced Version 1.0 include "snap/dump" capability, the ability to alter indicator status and variable contents at any breakpoint, the ability to generate debug versions of auto report programs and the ability to end the IDM execution phase and restart it to regain control of the executing program.

Version 2.0 is priced at $750, with a 30-day money-back guarantee. In addition, the vendor will forward the Version 2.0 monitor to all present and future customers with no changes or additional license fees. The company is located at P.O. Box 42809, Houston, Texas 77042.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HP Unveils Fiber-Optic Mux For Local-Area Net Links

PALO ALTO, Calif. — Hewlett-Packard Co. has unveiled a fiber-optic multiplexer providing eight RS-232C duplex channels for local-area terminal communications links.

The Model 39301A uses the vendor's HFBR-3100 duplex fiber-optic cable to connect the multiplexing units for communications up to 1,000 meters (3,280 ft) between any host processor and remote terminal cluster.

The nature of fiber-optic cable makes the link immune to electromagnetic interference such as lightning strikes, noisy motors, static discharge and crosstalk, according to HP. In addition, electromagnetic signals are not radiated from the cable, making tapping difficult and data communications more secure.

The multiplexer's capacity can be expanded from eight to up to 16 channels with the use of HP 8120-3569 adapter cables. Each adapter cable allows connection of two RS-232C devices to each of the eight ports on the multiplexer.

Each of these 16 full-duplex channels accommodates asynchronous data at rates up to 19.2K bit/sec. Each channel may also be used independently with different protocols and bit/sec rates without any adjustments to the multiplexer.

On-site diagnostics are possible with the fiber-optic multiplexer. A loopback switch and fiber-optic loopback cable, supplied with each device, help to isolate link failures to the multiplexer, the fiber-optic cable or the interconnected DP equipment.

Florida Carrier Plans In-State Microwave Net

By Phil Hirsch
CW Washington Bureau

ORLANDO, Fla. — Microtel, Inc., a Florida-based interstate resale communications carrier headquartered here, has requested authority to build its own intrastate microwave network. Initially, 2,400 low-speed channels interconnecting nine Florida cities would handle data transmission at speeds up to 9,600 bit/sec, as well as for voice.

Rates 20% to 40% below those charged by Southern Bell for like services are promised.

Four years after start-up, Microtel expects to have 14,400 low-speed channels built and 140 termination points. It also plans to be offering a variety of sophisticated data communications services at speeds up to 56K bit/sec.

Later, Microtel anticipates offering a digital termination system (DTS). M/A-Com, Inc., a major DTS supplier, has a 40% equity interest in Microtel.

Initially, Microtel will provide private network services using its own switching equipment and circuits leased from other carriers. As the company's own network comes online, this traffic will be switched over. The first leg of the Microtel network is scheduled to be operating by June 1983.

At the moment, Microtel is waiting for the Florida Public Utilities Commission to approve its construction plan and application for an intrastate communications carrier's license. Also, since the new network will have to interconnect with local exchange facilities in each of the Florida cities Microtel plans to service, access agreements have to be negotiated with the operators of those facilities.

Reportedly, Microtel and Southern Bell, which operate most of the local exchanges, are far apart on the costing of access charges.

Emulator Aid Available For TI Users

DAYTON, Ohio — A specialized communications package for Texas Instruments, Inc. Model 990/10 or 990/12 users is available from Micro-Base Corp. The DSR & TTY emulator package allows TI users communications to time-sharing or host computers via TI Model 911 CRT terminals, according to the vendor.

The asynchronous Device Service Routine (DSR) has been used to interface devices such as paper tape reader/punch to the 990 through the TTY/EIA board. The Teletypewriter Emulator (TTY/EMU) works with the DSR to provide a soft, table-driven communications ability.

The DSR & TTY/EMU performs required operations on files when off-line, then transfers them to or from the time-sharing or host computer. This increases efficient use of on-line time and minimizes time-sharing costs.

The software costs $2,500 from Micro-Base at 211 Byers Road, Miamisburg, Ohio 45342.

With Virtual Terminal System

Ascii Units Gain 3270 Emulation

MOUNTAIN VIEW, Calif. — Icot Corp. has unveiled the first in a series of virtual terminal systems said to enable low-cost Ascii terminals to emulate IBM 3270 terminals and printers.

The Icot 352 virtual terminal system is the first in the vendor's 35X series and supports a mix of 12 different Ascii terminals emulating the 3270 products. The Ascii terminals can be attached locally or through dial-up leased lines. The 352 also supports automatic speed and word format detection for all dial-up applications.

The 352 communicates using the Binary Synchronous Communications protocol, but provides Systems Network Architecture-like capabilities, Icot said.

Multiple logical control unit addresses can be assigned to each of the two physical controllers, allowing the 352 to appear as multiple controllers on each line. This permits an Ascii terminal to access multiple applications that may be operating in the connected hosts.

The 352 costs $7,600 from Icot at 830 Maude Ave., Mountain View, Calif. 94043.

Terminal Fits IBM 3270 Nets

DALLAS — Carterfone Communications Corp. has introduced a CRT terminal designed for IBM 3270 network locations that do not require clustered display systems.

The Model 7276 communicates with IBM host systems via multipoint Binary Synchronous Communications protocol over nonswitched communications facilities at speeds up to 9,600 bit/sec. Functionally compatible with the IBM 3276, the 7276 supports the standard 3270 screen attributes, Carterfone said.

The 7276 costs $3,450. Carterfone is at 1111 W. Mockingbird Lane, Dallas, Texas 75247.

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Net Management Tool Packs Data Entry Utility

IRVINE, Calif. — Managers of teleprocessing networks can reportedly resolve data communications problems from a central location with a management tool recently introduced by Peregrine Systems, Inc.

The Peregrine Network Management System (PNMS) uses an IBM Series/1 as a communications monitoring station and comes with an interactive data entry utility that allows problem formats to be designed to user specifications, a company spokesman said.

The data entry utility also enables users to define network management files and their interrelationships, the source said.

PNMS reportedly incorporates a problem management facility with three levels of alerts, an information retrieval facility and a report generator.

The information retrieval system consists of a query-by-example, multikeyed relational data base for maintaining network configurations, inventories, or operationally defined information, the spokesman said.

The problem management facility, by contrast, reportedly produces user-defined problem formats, which in turn are used to manage every network element, according to the spokesman.

Information about a given problem is retrieved from PNMS's relational data base and then inserted into the appropriate problem format, according to the source.

The report generator, meanwhile, allows users to define key management reports and automatically schedules those documents at prearranged intervals, the source said.

PNMS costs $39,500 and is available from Peregrine at 15530 Rockfield Blvd., Building C, Irvine, Calif. 92714.

Emulator Out For Mohawk's Series 21 Line

PARSIPPANY, N.J. — A Hasp multileaving/interleaving terminal emulator for Mohawk Data Sciences Corp.'s Series 21 line of distributed processing systems is available from that vendor.

The MDS Hasp allows operators of properly configured Series 21 systems at remote job entry sites to transmit source programs for compilation, input files for processing and receive processed output for report generation by duplicating the communications characteristics of an IBM remote workstation (Models 360/20, 22, 25 and 30).

The product supports transmission rates of up to 9,600 bit/sec (4,800 bit/sec concurrently) over switched or leased lines (2- or 4-wire facilities). Ebcdic transmission, with or without transparency, is supported.

The emulator costs $2,500 to purchase or $25/mo per system, MDS said from Seven Century Drive, Parsippany, N.J. 07054.

Guide Explores IEEE Standard

NEWTON HIGHLANDS, Mass. — A technical white paper on the proposed IEEE standard for local-area networks is scheduled for publication Feb. 1.

"A Guide to IEEE 802" was written by Nathan H. Tobol, consulting engineer for Codex Corp. and chairman of the IEEE 802 Local-Area Networks Media Subcommittee. It explores the nature of the proposed standard, options for its implementation and means to ensure compatibility between implementations.

Among the specific topics addressed in the report are the relationship of the standard to Ethernet, the media-independent interface, token access, implementation alternatives, local-network logical link control, Ethernet compatibility, network control and test capability and who's who in local-area networks including companies and people.

Published by OEMguide Publications, the report costs $800 before Feb. 1 and $1,000 after that date. The report is available from Lakewood Associates, P.O. Box 168, Newton Highlands, Mass. 02161.

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Firm's CPU Does All But Lasso Cattle

FORT WORTH, Texas — Computerization is a lot of bull — at least for a local meat firm here that uses a computer to do everything but rope and brand cattle.

"When things are properly organized, it simply becomes a matter of harnessing the computer and it does the work," Manny Rosenthal, president of Standard Meat Co., said.

Standard Meat is one of the top meat suppliers, catering to seven of the country's 10 leading chain steak houses and supplying nearly 50% of the meat used to top pizzas in the U.S. The firm also has a hefty list of overseas clients, which all translates into an annual $100 million in business, Rosenthal said.

Although the firm was founded in 1935, it did not really have a phenomenal spurt in growth until 1966, when chain steak houses began appearing throughout the U.S. Soon after, the company found itself refusing business because its mostly manual administrative flow prohibited adding any more clients to its swelled list.

Five years ago, the company decided to install an IBM 4331-2 computer to handle its paperwork and today most of the necessary "paperwork" is actually done without paper, Rosenthal explained.

"We've accepted opportunities and taken on business we couldn't have before, simply because of the data processing capability we now have," Standard's president said. In fact, business is now going so well the firm may have to add a second computer soon to keep up with the processing demand, Gene Short, manager of the firm's DP department, said.

Presently, the firm's computer has 2M bytes of main memory and virtually orchestrates Standard's whole meat packing operation — from pasture to plate, Rosenthal quipped. The computer runs under DOS/VSE Release 2 and has four IBM 3370 disk drives.

Standard uses the computer to do a lot of routine and not-so-exotic things like order entry, billing, invoicing, pricing and general ledger. However, it is also used to do some processing considered to be innovative in the meat industry, such as material requirements planning, automated bar coding and commodity ration hedging systems, Rosenthal said.

Standard's business is primarily one of accepting orders, pro-

(Continued on Page 126)

Runs With IBM Mainframes

Univac Adds Enhanced Laser Printer

BLUE BELL, Pa.— Sperry Univac has introduced an enhanced version of its intelligent high-speed, high-volume laser printer system designed for use with IBM mainframes.

The 0777-95 laser printer is compatible with IBM's 3800 printer at the IBM channel interface. It can be used with IBM 370/145, 155-II, 158, 158-2, 158-3, 165-II, 168 and 168-3 processors; the IBM 3031, 3032 and 3033; and the IBM 4331 and 4341. It runs under the DOS/VSE, OS/VS1, OS/VS2, MVS and VM/370 operating systems.

The printer includes a Univac minicomputer that serves as a controller to ensure throughput characteristics, a spokesman said. However, when used in an on-line mode, the printer system is under the control of the IBM host computer operating as a laser printer subsystem and is totally dependent on the IBM-supplied host software for data preparation and printer management.

The inherent minicomputer has a microprogrammed 16-bit word-oriented architecture and contains 256K bytes of main storage. Additional system components include a CRT display console, a 10M-byte cartridge disk drive, a magnetic tape unit and an optional auxiliary console printer.

The 0777 printing system is capable of printing up to 21,000 line/min. Print lengths can be up to 13.6 in. In addition, the printer will produce up to 136 col at 10 char./in., 163 col at 12 char./in. and 204 col at 15 char./in.

In off-line modes, the printer can produce multiple copies up to 255 times once the data is loaded into a page buffer, with reportedly no operator intervention.

Other advantages of the system include page-by-page rather than line-by-line printing to produce a constant printing rate of 206 page/min; the ability to intermix various fonts and graphics; and an easy-to-load paper feed system, a spokesman claimed.

The 0777 printer, including a controller and control software, costs $389,000, or $8,254/mo on a 5-year lease agreement. Maintenance for the basic system is $1,000/mo, plus a maintenance charge for each foot of paper that is used, the spokesman noted.

The laser printer will be available in September 1982 from the firm through P.O. Box 500, Blue Bell, Pa. 19424.

Have a DDP Tale to Tell?

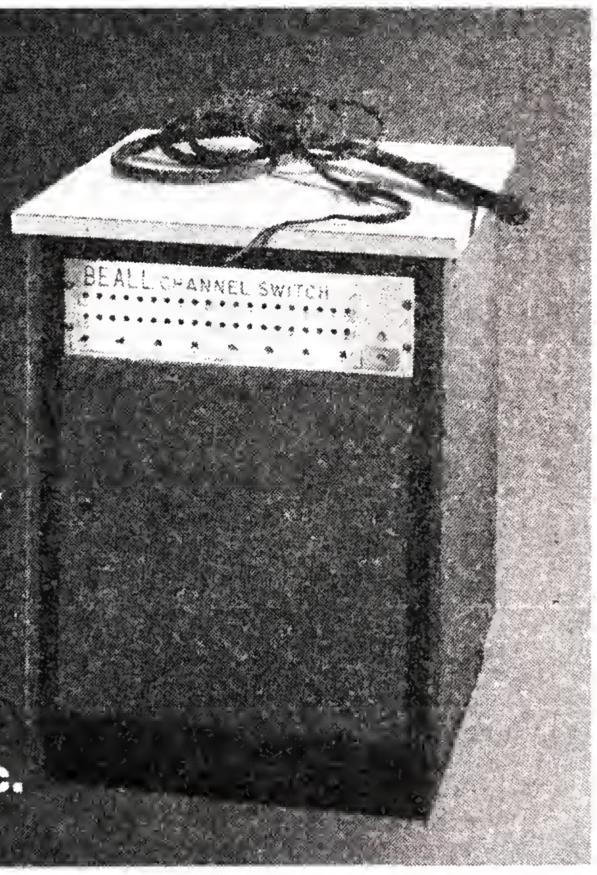
Are you distributing your data processing more, but enjoying it less? Have you some secret DDP formula that changed your mild-mannered system into a super-powered wonder? Or are you satisfied with a one-computer one-site arrangement?

Nothing in data processing generates as much controversy as distributed data processing. For every user who extols the glories of scattering systems far and wide to get a better grip on data, there are two who insist the best road to success is one that keeps the computers close to hearth and environmentally controlled home.

What do you think?

If you have a DDP tale to tell and would like the world to read about it this February in *Computerworld*'s Special Report on distributed processing, send your story to Tim Scannell, senior editor/systems, *Computerworld*, P.O. Box 880, Framingham, Mass. 01701. Submissions should be a minimum of five and a maximum of eight double-spaced, typewritten pages. Charts, graphs and photographs are welcome.

Articles can be written on leftover Christmas wrapping paper or spelled out in tinsel, as long as they are received by Jan. 15.



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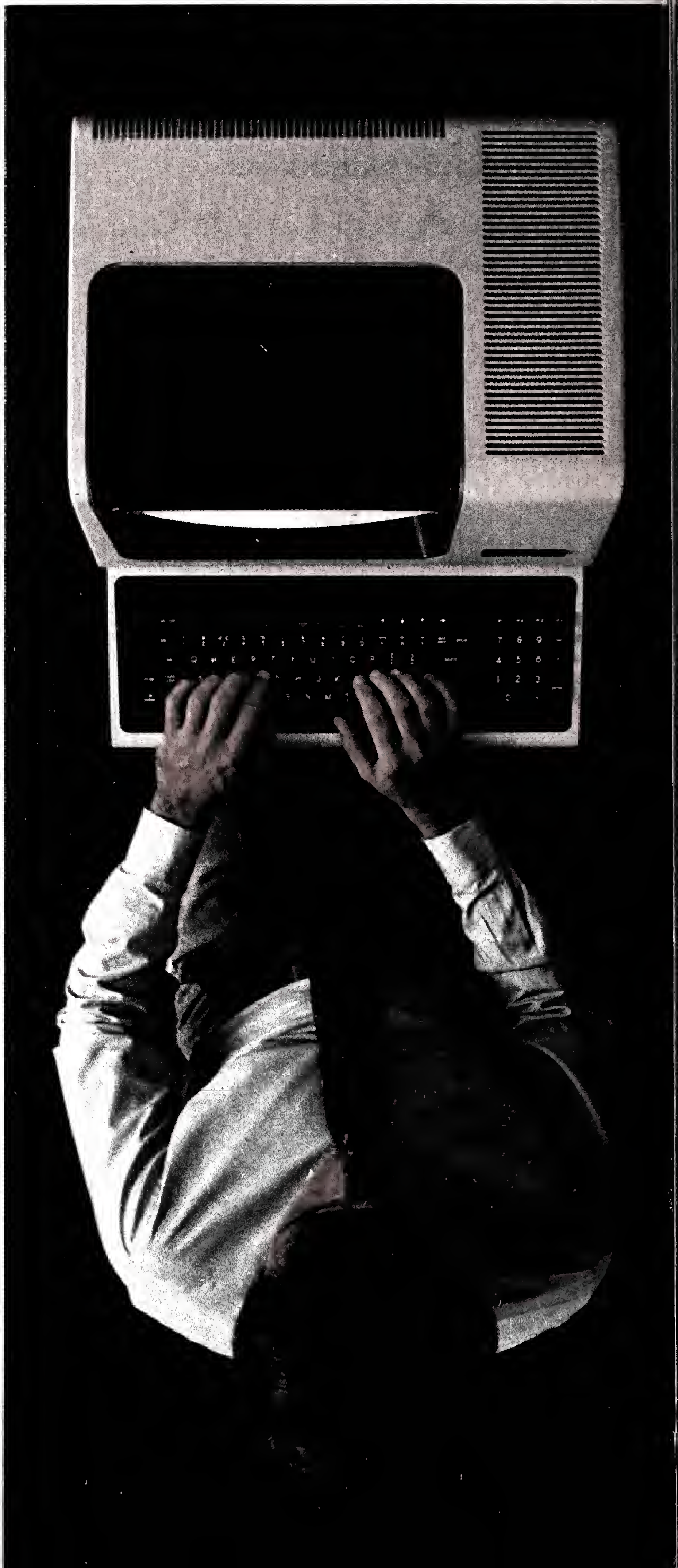

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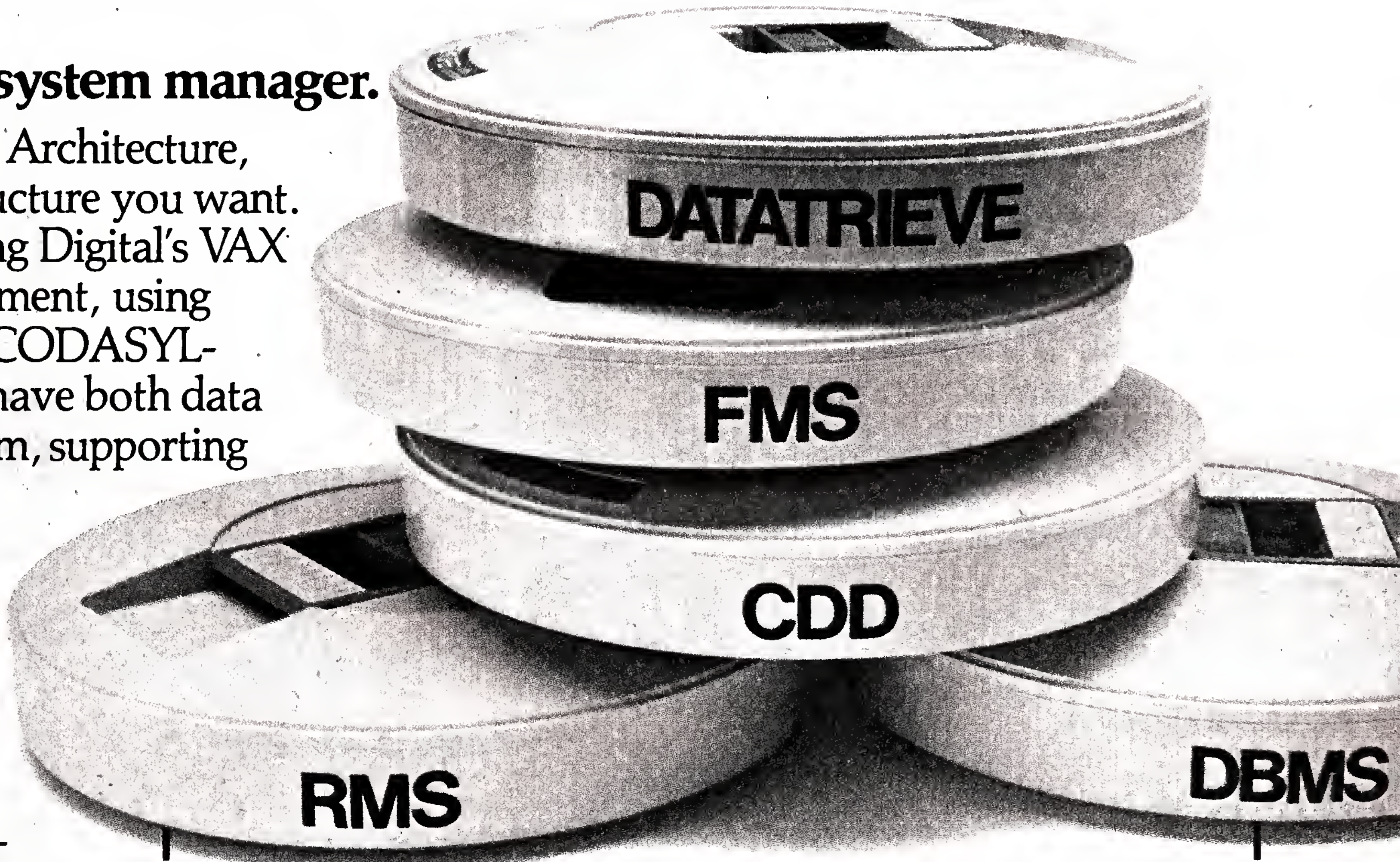

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Firm's CPU Herds Cattle From Pasture to Plate

(Continued from Page 123)

cessing the meat, shipping it out and maintaining control of the inventory. These seemingly mundane chores are made difficult because the price of meat fluctuates daily. To make things more involved, the company obviously cannot have its product sitting around the warehouse due to a mixed up or cancelled order.

"Meat has a deterioration factor — a limited shelf file even with special vacuum packaging," Rosenthal pointed out. "You have to constantly update pricing figures and inventory. What comes in must be scheduled to be aged, processed and shipped according to an exact timetable.

"We like to have 48 hours' notice, but we normally can handle any significant meat order in 24 hours," he said.

To solve the pricing problem, Standard subscribes to a commodity wire that tells purchasing and marketing personnel on a real-time basis the current price of any given cut of beef.

"We look at market price changes continuously and modify our replacement costs accordingly, all on the computer," Short said.

Meat orders come in by telephone and are entered by terminal into the 4331. When an order is ready, a complete invoice is packed with it and sent to the customer.

"We're able to bill customers that rapidly because of the computer," Short added.

On routine domestic orders a simple telephone number is the key to nudging the 4331 into action.

After the customer's order is entered into the computer it appears on the packing floor printer as a new shipment order. The material to be shipped is then picked, invoiced and goes out to the truck. It takes about two to four hours to load a truck and the invoice goes with it when the driver is ready to pull away, Short noted. The printing of the invoice is simultaneously accompanied by posting of accounts receivable and relief of inventories.

Rosenthal and Short consider the computer invaluable for inventory management, order processing, merchandise processing and other facets of their low-market business.

"Nickels and dimes count here. Staying abreast of changing meat prices is essential and we must be as precise as possible," Rosenthal said.

More than a million pounds of steaks and other meats move through the plant every week. So the technique in cutting beef, the time element, how much of the meat is wasted, whether too much fat is kept all have a productivity factor that translates into profit or loss and is tracked by the 4331.

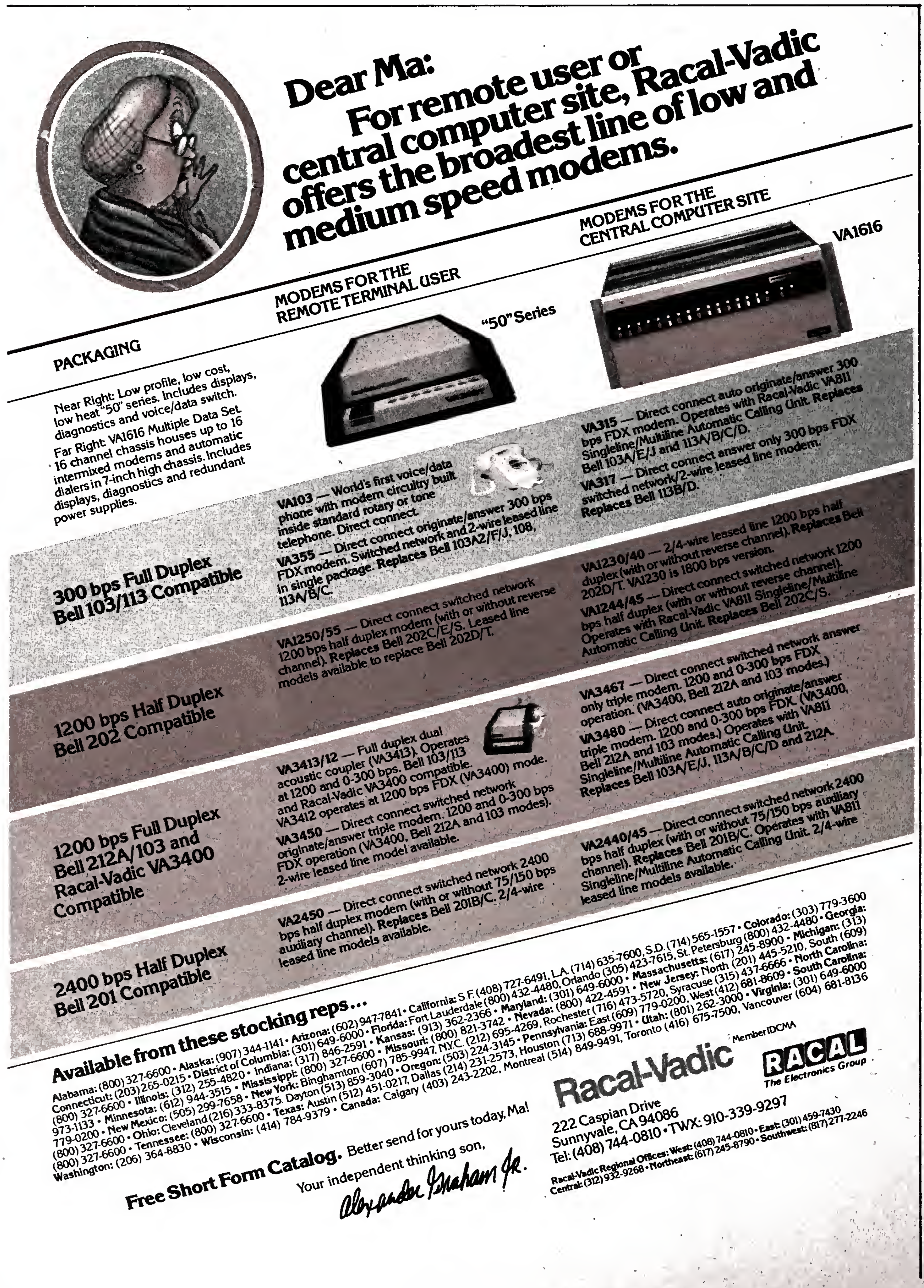
To watch costs, the company has a "quality circle" arrangement where employees get together — on their own — and discuss problems in their work areas. They measure themselves against standards. And they generally come up with their own ideas on how to improve productivity and working conditions, Rosenthal said.

"I've watched productivity here mount to a point where the increase actually covers much of our semiannual pay raises. Our people are rewarding themselves and being recognized because the computer is tracking their efforts," he added.

The computer analyzes employee work habits and sometimes spots "a technique or procedure we want to study more," Rosenthal said.

Cash flow is pinned down at Standard Meat because the 4331 can send the invoice along with the order. In the order-entry procedure, all orders can be entered on-line into the system, along with validated customer identification and credit verification. Customer profile information can be added as well as delivery instructions. Each line of data on the 4331 can be checked for accuracy, the inventory reviewed for availability and appropriate substitutions can be suggested, Short said.

The 4331 can then total each order, along with correct transportation amounts.



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VA317 — Direct connect answer only 300 bps FDX switched network/2-wire leased line modem. **Replaces Bell 113B/D.**

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VA1250/55 — Direct connect switched network 1200 bps half duplex modem (with or without reverse channel). **Replaces Bell 202C/E/S.** Leased line models available to replace Bell 202D/T.

VA1230/40 — 2/4-wire leased line 1200 bps half duplex (with or without reverse channel). **Replaces Bell 202D/T.** VA1230 is 1800 bps version.

VA1244/45 — Direct connect switched network 1200 bps half duplex (with or without reverse channel). Operates with Racal-Vadic VA811 Singleline/Multiline Automatic Calling Unit. **Replaces Bell 202C/S.**

1200 bps Full Duplex Bell 212A/103 and Racal-Vadic VA3400 Compatible

VA3413/12 — Full duplex dual acoustic coupler (VA3413). Operates at 1200 and 0-300 bps. Bell 103/113 and Racal-Vadic VA3400 compatible. VA3412 operates at 1200 bps FDX (VA3400) mode.

VA3450 — Direct connect switched network originate/answer triple modem. 1200 and 0-300 bps FDX operation (VA3400, Bell 212A and 103 modes). 2-wire leased line model available.

VA3467 — Direct connect switched network answer only triple modem. 1200 and 0-300 bps FDX operation. (VA3400, Bell 212A and 103 modes.)

VA3480 — Direct connect auto originate/answer triple modem. 1200 and 0-300 bps FDX. (VA3400, Bell 212A and 103 modes.) Operates with VA811 Singleline/Multiline Automatic Calling Unit. **Replaces Bell 103A/E/J, 113A/B/C/D and 212A.**

2400 bps Half Duplex Bell 201 Compatible

VA2450 — Direct connect switched network 2400 bps half duplex modem (with or without 75/150 bps auxiliary channel). **Replaces Bell 201B/C.** 2/4-wire leased line models available.

VA2440/45 — Direct connect switched network 2400 bps half duplex (with or without 75/150 bps auxiliary channel). **Replaces Bell 201B/C.** Operates with VA811 Singleline/Multiline Automatic Calling Unit. 2/4-wire leased line models available.

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Mini Bits

Monthly Newsletter Targets IBM 8100 Users

CUPERTINO, Calif. — DPX, Inc. has announced a monthly newsletter for users of IBM's 8100 line of processors.

Called Update/PX, the newsletter will reportedly offer updates on IBM product announcements as well as hardware and software announcements from other vendors. Part of the newsletter will serve as a forum for 8100 users to air problems and seek advice, the vendor said.

The newsletter costs $120 a year, the firm said from 10902 Northfield Sq., Cupertino, Calif. 95014.

Interfaces Increase Corvus Compatibility

SAN JOSE, Calif. — Corvus Systems, Inc. has announced interfaces said to make its line of Winchester disk drive systems and local-area network fully hardware- and software-compatible with the Xerox 820 system as well as the IBM Personal Computer.

Storage capacities of 5M, 10M and 20M bytes on 5¼-in. and 8-in. Winchester disk systems will be available in mid-January. Prices range from $3,750 to $6,450 from the firm at 2029 O'Toole Ave., San Jose, Calif. 95131.

Zeta Plotters Gain HP's Graphics Language

CONCORD, Calif. — Nicolet Zeta Corp. has unveiled an interface that is said to enable its plotters to accept and plot using Hewlett-Packard Co.'s Graphics Language (HPGL).

The interface is available with Zeta's Models 1553, 1453B, 1453SX and 3653SX plotters and will accept input from the HP 9800 series of computers or any other source that generates HPGL, a spokesman said. Input can be received via RS-232C or IEEE 488 interfaces.

The interface option is available for $250 with the purchase of a Zeta plotter. Field upgrades are also available, the spokesman noted.

Nicolet Zeta is located at P.O. Box 4003, Concord, Calif. 94524.

Power Conditioners Provide Protection

SAN DIEGO, Calif. — Topaz, Inc.'s Electronics Division has introduced a series of power conditioners that are said to protect small business computers from power line noise, voltage sags, surges and power brownouts.

The Topaz Line 2 conditioners are available in power ratings ranging from 400VA to 2,000VA. Each conditioner is a self-contained, portable unit that combines a noise suppressing isolator with the voltage regulation properties of an ac line regulator, a spokesman said.

The unit is designed to plug into existing 120V outlets. Prices for the conditioners start at $480 and are available from the firm at 9192 Topaz Way, San Diego, Calif. 92123.

Graphics Printer Mated With Minis

PITTSBURGH, Pa. — A graphics printer called the LBP-10 has been made available by Three Rivers Computer Corp. for use with Perq minicomputer systems.

The laser printer offers hardcopy print-out capability to the firm's single-user workstations. The Perq interface allows dot-addressability to print font text, lines, halftones and other graphics. Print speed is 10 letter-size page/min on standard paper. Cassette capacity is 190 sheet/cassette.

The LBP-10 comes with simple text printing and "screen dump" software, all cables and accessories and costs $15,000. Additional information can be obtained from the vendor at 720 Gross St., Pittsburgh, Pa. 15224.

Winchester Disk Added for Micros

BENTON HARBOR, Mich. — An 8-in. Winchester disk system with an 8-in. floppy disk drive has been added to the Heath Co./Zenith Radio Corp. microcomputer line.

The Z-67 with nonremovable Winchester is said to increase the storage capacity of Heath's H-89 computer to 10 million bytes, with the 8-in. floppy diskette backup providing an additional one million bytes. The set is compatible with the IBM 3740 format and will record in single- or double-density and on either single- or double-sided tapes.

The assembled Z-67 Winchester Disk System costs $5,800, including a $750 software credit. More information is available from Heath Co. at Dept. 350-385, Benton Harbor, Mich. 49022.

Prices Decreased 20% On Memory Boards

ORANGE, Calif. — Measurement Systems and Controls, Inc. has cut prices on its DM6400 series of memory boards. Prices were cut 20% on 32K-, 48K- or 64K-byte boards.

All boards are tested and expandable to 64K bytes, the vendor said.

The DM64 now costs $660, the DM4800 costs $615 and the DM3200 costs $575, the vendor said from 609 Deep Valley Drive, Palos Verdes, Calif. 90274.

ROM Simulator Out For Software Design

BELMONT, Calif. — Inner Access Corp. has announced Romsim, a IEEE-696-compatible read-only memory simulator for software design applications.

The unit is supplied with driver software in Basic and Forth. It simulates programmable read-only memories in byte- or word-wide memory configurations, the vendor said.

The boards cost $495, the vendor said from 517-K Marine View, Belmont, Calif. 94002.

Large Brokerage Firm Puts Stock in Micros Rather Than One CPU

ESCONDIDO, Calif. — Why would one of the largest private money loan brokerage firms in California use a handful of microcomputers rather than one large computer system to handle its data processing? Primarily to save money.

In fact, the National Mortgage Exchange (NME) expects to save about $30,000 per office — which is a lot of money considering that the firm has about 268 franchise locations — by using the 11 Alpha Microsystems, Inc. business computers it purchased earlier this year, Robert Edmondson, NME's executive vice-president, said.

The NME is to its franchises what the stock exchange is to investment brokers. The firm helps each of its real estate brokers by putting them in touch with a ready market for their trust deeds, Edmondson continued. Therefore, it is important for the exchange to have up-to-date information and be able to quickly provide that information to its members.

System Purchase

To keep up with this demand and maintain an edge over the competition, NME purchased nine Alpha Microsystems AM-1030 systems, each with 10M bytes of hard disk storage and two AM-1050 systems with 90M bytes of hard-disk storage and two AM-1050 systems with 90M bytes of hard-disk storage. The firm based here that specializes in mortgage brokerage software packages.

Although NME purchased a standard mortgage brokerage software package from the Alpha Microsystems dealer, it also hired its own in-house progamming staff to add special features to the system, Ann Abramson, NME's systems analyst, stated.

The microcomputer-based systems handle loan processing, the management of trust deeds and payments to investors. The systems also print loan papers and handle credit references.

Each of NME's offices is equipped with communications software and a modem, Abramson continued. The communications capability allows NME to access any of the computers and transmit files.

"We use it for development and to control all problems and distribution from one office," Abramson noted. "This way, if any of the branches has a problem we can modify a file or program at the head office, transmit the new version to the branch and they're up and running."

Future Plans

Although NME currently uses the communications software just to support its branch offices, future plans call for using it as a base-linking network.

When this happens, branches will be able to access a trust deed availability list, containing current customer status and property availability.

Other plans include more streamlined security measures and a complete mortgage brokerage system that can handle all computations and management from loan applications and loan servicing to final payment.

Panasonic Desktop Processor Comes With Disk Drive

SECAUCUS, N.J. — Panasonic Co. has announced a desktop processor, the Model JD-850M. The unit comes with a standard disk drive.

The unit features a separate type keyboard, a 12-in. nonglare CRT display, two 8-in. double-sided floppy disk drives and an optional parallel interface. The unit features 56K bytes of random-access memory and 2K bytes of programmable read-only memory. It can accommodate up to 2M bytes of disk storage and supports the CP/M operating system, according to the vendor.

Units cost $8,000 and the JK-600 — the optional 8-in. fixed disk drive unit — costs $3,500, the vendor said from One Panasonic Way, Secaucus, N.J. 07094.

Otrona Bundles Graphics

BOULDER, Colo. — Otrona Corp. has included its graphics hardware package in the base price of its Attache professional computer.

The package was previously sold as an option for $595. It includes a dedicated 10K-byte graphics display memory, a 4K-byte alphanumeric display memory and it's Charton software. The new pricing scheme provides an Attache base price of $3,995 for a 64K-byte system with Z80A and direct-memory access processors, 5¼-in. CRT terminal, dual 5¼-in. floppy disks, CP/M, word procesing software, Basic compiler, graphics package, asynchronous and bisynchronous communications and other features.

Otrona is located at 4755 Walnut St., Boulder, Colo. 80301.

Before you choose your backup center... ask yourself these questions.

The Recovery Center you select in your computer disaster contingency plan could some day mean the survival of your business. SUNGARD recognized the growing concern about computer dependency in 1978, and opened the first and still most comprehensive Recovery Center available. We're well down the learning curve in offering a capability designed to service the recovery needs of today's critical on-line environments. There are significant contrasts between SUNGARD Recovery Services and some of our competitors. These contrasts should be clearly understood by you and your top management if you're serious about backup. Below are some of the most pertinent questions. There are others. Give us a call at 800-523-4970. SUNGARD has the answers.

Q. Can I be confident the Recovery Center will work?

A. You can if you can demonstrate to yourself and to your management that you have a tested backup capability that runs your critical applications. SUNGARD subscribers have conducted over 600 successful tests of their backup systems. Their early and continuous testing has the support of our technical professional staff, which has the skills and experience to make that job easier.

Q. How are tests supported?

A. At SUNGARD, they're supported with qualified technical SUNGARD personnel from every appropriate discipline. If you don't think you need experienced technical support (software, telecommunications, operations) to achieve a testable backup capability, you may have too many people on your staff.

The experience gained by a Recovery Center staff in supporting customer testing improves your ability to develop an effective capability. The absence of that experience (or worse, the absence of a Recovery Center staff) has the opposite effect.

Q. Can I back up my critical networks?

A. You can at SUNGARD. Our most effective answer to this question is the many users who have a tested capability today at SUNGARD. Non-believers are converted by a visit to our centers. At our Philadelphia Centers, we have in place and operational more than 150 modems of various manufacturers. Dial backup units, central office connections, cabinets, cabling and over 100 3705 ports are in place and operational. All these elements for network backup are interconnected through a Network Control Center which allows for rapidly customizing the capability to the unique requirements of each user. And all these elements (except the modems) are in our basic price. If you can't back up your on-line systems, you haven't accomplished anything.

Q. Is the hardware adequate to my needs, current and compatible, or is it "tired iron"?

A. You shouldn't sign for a 370-based backup system when you already have the 3081 in your plans. The 165 is unsupported now. What IBM version of the SP will leave the 168 behind? At SUNGARD we have current IBM hardware installed and a firm commitment to the 3081. We replaced our 168 in 1979. And we're committed to remaining current, not only with processors, but also with peripherals.

Q. Is the facility itself suitable and secure?

A. Each of the three SUNGARD Recovery Centers has an average of more than 30,000 square feet dedicated to supporting the recovery needs of SUNGARD subscribers. This includes, in addition to the backup configuration, a ready-conditioned space in each center with sufficient cooling and power for a replacement 3033 and associated peripherals. Four thousand square feet of office and terminal space is equipped with power and telephone jacks for your recovery team. And the entire facility is secured with a controlled access system and fire detection and protection systems you should expect in a first class center.

Sungard™ Centers have the answers.

Q. Who are the other subscribers, and are they satisfied with their Recovery Center?

A. As a SUNGARD subscriber you will have the right to know who the other users of your backup center are. As a SUNGARD prospect we'll share with you the names of Fortune 500 Industrials and Fortune 200 Financial institutions which have agreed to let us refer you to them to help you evaluate SUNGARD. You'll recognize the names and appreciate their serious commitment to providing the best available Recovery Centers for their installations. Our subscribers can report to their management with confidence that they have a tested recovery capability that works.

Q. What is the true cost of having a Recovery Center to go to in the event of a computer disaster?

A. We're the high-priced spread, but you get much more with SUNGARD. Our standard offering includes everything you need, so your cost with SUNGARD is very visible. Hidden costs to make other centers usable, especially network backup, can drive their price past ours.

We think that a workable disaster recovery solution is part of the cost of doing business in today's computer-dependent world. When compared with other accepted costs of doing business, your monthly recovery fee at SUNGARD is:

- Less than the cost of a security guard around the clock.
- About half of what you pay for monthly maintenance on your processor.
- Less than one string of disk drives or bank of tape drives.
- The equivalent of about $1.50 per square foot per year, including equipment, test shifts and technical support.

Q. Are there other costs?

A. Not for the SUNGARD Recovery Center. There is obviously cost associated with developing and maintaining your recovery capability. Our contingency services organization can bring its experienced staff to your site, to assist you in the development of that capability at your option. But the cost of having a second site at SUNGARD, including ample test shifts and extensive network backup equipment, is all in our basic fee.

Q. Can I test remotely?

A. Yes, you can. Our plan includes the ability to run your backup system without sending your recovery team to the SUNGARD Center. We still suggest that you come to the Center once a year to test, in order to remain familiar with your second center.

With remote testing and the opening of our third SUNGARD Center in Chicago in December, and our West Coast and Southwest Centers planned for 1982 and 1983, distance should not be a significant factor. And this network of SUNGARD Centers offers you added protection in the event that your primary SUNGARD Center is occupied by another subscriber experiencing a disaster.

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Savin Comes Out With Two OA Systems

By Jeffry Beeler
CW West Coast Bureau

SUNNYVALE, Calif. — A longtime supplier of photocopiers expanded the scope of its business with the introduction of two systems lines that users can reportedly teach themselves how to operate with the help of an interactive training program.

The announcement of Savin Corp.'s Information Station 1000 and 2000 series systems marks the company's debut in the DP field and complements its line of office automation products, which already included two word processing offerings.

One of the purported highlights of the 1000 and 2000 systems families is a software feature that interactively prompts users for information about their businesses and enables customers to tailor their programs to suit their individual corporate needs.

Touchpanel Command Strips

The two product lines also come with interchangeable "touchpanel command strips" that allow users to execute complex functions without entering a long sequence of keystrokes, a company spokesman said.

Situated just above the systems' detachable keyboards, the touch-panel strips consist of two rows of touch-sensitive function keys that reportedly permit customers to initiate commands with the press of just one pad. Each key corresponds to a different word or information processing command and is labeled in English rather than in code.

Both the 1000 and 2000 systems families consist of four members that are said to support the same hardware and to be upgradable in the field. Applications software written for one of the Savin systems can be transferred to any of the other seven models and can run without modification, the spokesman said.

Repair, Maintenance

Repair and maintenance of the systems are reportedly supplemented by a customer assistance center that users anywhere in the U.S. can reach by dialing a toll-free phone number. Known as the Computer-Assisted Response for Emergency. Service, the hotline provides a means for remotely answering customer questions and diagnosing systems problems.

Hardware for both the 1000 and 2000 series systems comes mainly from Convergent Technologies, Inc., a Santa Clara, Calif.-based supplier of intelligent workstations. The 1000 family corresponds to Convergent's Application Workstation product line; the 2000 series, to Convergent's Integrated Workstation offerings, according to the vendor.

To Convergent Technologies' hardware, Savin plans to add its own application and WP software and then sell the finished systems directly to end users through its existing network of branch offices and dealers.

Customers of the 16-bit Savin systems typically will include both first-time and experienced users with annual revenues ranging up to $20 million.

Instruction Aids

In addition to their other features, the 1000 and 2000 series systems come with an operator-instruction program that monitors users' training and provides real-time feedback about their performance, the spokesman said. The Program-Assisted Learning feature reportedly aids customer self-instruction by interacting with the systems' applications software.

All four members of the 1000 systems family are built around a 5MHz Intel Corp. 8088 microprocessor, incorporate 4K bytes of read-only memory (ROM) and expand to accommodate up to 512K bytes of random-access memory (RAM). Except for the bottom-of-the-line Model 1001, which lacks mass storage entirely, each system in the series supports both 5¼-in. floppy and 5¼-in. Winchester hard disk units, for a maximum external memory capacity of more than 5.3M bytes, the source said.

All four 2000 series models, by contrast, incorporate a 5MHz Intel 8086 microprocessor, 8K bytes of ROM and up to 640K bytes of RAM. Each system also supports 8-in. floppy disk units and a choice of 10M- or 20M-byte hard disk modules, for a maximum mass storage capacity of 60.5M bytes, a spokesman said.

Both of the Savin systems families incorporate a 15-in. display unit, support Qume Corp.'s 45-char./sec Spring 9 impact printer and operate either in stand-alone or clustered mode. The 1000 series models are said to support up to eight workstations; the 2000 series, up to 16.

Applications software currently available with the systems includes packages for time billing, general distribution and WP, with additional programs scheduled for release during the coming months, the spokesman said.

Single quantity prices for the Savin systems start at $7,800, which covers a basic Model 1001 incorporating a 128K-byte CPU, 4K bytes of ROM and no mass storage, according to the vendor. Limited shipments of the products begin this month from Savin in Valhalla, N.Y. 10595.

For OS, DOS Environments

Business Tool Fits Most 8080s, Z80s

PRINCETON, N.J. — Applied Data Research, Inc. has introduced an electronic mail system (EMS) to complement its on-line word processing system, ETC.

Reportedly user-friendly, ETC/EM features electronic mailboxes, automatic message routing and broadcasting, correspondence archiving, hard-copy printing and multiple levels of security.

Support will be provided for IBM 3270-type terminals and dial-up devices. The system, for all IBM DOS and OS environments, starts at $16,500 for a permanent license. Monthly, three- and five-year leases are also available from the firm at Rt. 206 & Orchard Road CN-8, Princeton, N.J. 08540.

ECS Expands Voice Messaging

DALLAS — ECS Telecommunications, Inc. has expanded its voice messaging product lines with the addition of a product designed to serve up to 1,000 users.

The VMX/16 provides users with private voice mailboxes that allow 24-hour communications. The sender of a voice message uses any Touch-Tone telephone to dial into a computerized voice message exchange.

The VMX/16 costs $195,000 from ECS at 1241 Columbia Drive, Richardson, Texas 75081.

Report Studies Optical Disk Usage

NORWALK, Conn. — International Resource Development, Inc. (IRD) is offering a 179-page report on optical disk usage in the office.

Among the 10 sections in the report are sections dealing with "The Significance of Optical Disk Technology," "The Continuing Role of Rotating Memories," "Where Does Micrographics Fit?" "Local Office Networks — Pathways to the Electronic Filing Cabinet," "The Elements of an Electronic Filing System — Digital Workstations," "The Elements of Electronic Filing Systems — Data Base Management Systems," "Electronic Filing 10-Year Market Projections" and "Key Participants in the Emerging Electronic Filing Market."

The report costs $1,285 from IRD, which is headquartered at 30 High St., Norwalk, Conn. 06851.

Business Tool Fits Most 8080s, Z80s

NEWARK, Ohio — Integrated business software for small to mid-size business is available from The Information People, Inc. The package will reportedly run on most 8080/Z80 microcomputers.

The Office System 80 features word processing and records management plus simplified disk maintenance and backup facilities. The primary component is The Organizer, which serves as the link between a variety of program functions and the operator, the vendor spokesman said.

The software may be purchased in its entirety for between $1,600 and $2,500 or The Organizer may be purchased for $200 and be used as the core of a user-built system, according to the vendor. The Information People is located at 443 Hudson Ave., Newark, Ohio 43055.

Law Office System Gets Aid

BUFFALO, N.Y. — The Office Automation Division of Comptek Research, Inc. has unveiled an accounts payable package that is available with the Barrister Law Office Management Systems.

The package records large numbers of invoices, automatically writes checks and provides reports useful for cash flow forecasting and vendor analysis.

Information retained by the program includes vendor identification number, name, address, federal form 1099 code, Dunn & Bradstreet number and social security number.

The package licenses for $4,500, the vendor said. More information is available from One Technology Center, 45 Oak St., Buffalo, N.Y. 14203.

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MARCH 2-5, 1982

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COMPUTERWEEK *is coming! The three major publications of CW Communications/Inc. have teamed up to offer you an unprecedented opportunity to participate in an innovative learning experience. This unique three-dimensional strategy gives you a selection of sessions designed to cover* **every** *facet of the computer industry so you can decide to sample the latest new ideas in* **your** *field, or you can switch to new areas for professional mind-broadening! Over 80 conference sessions to choose from! Over 200 industry leaders to learn from!*

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- *Software: New Languages and the Application Development Process*

Day III — APPLICATIONS
- *Why Management Hates DP*
- *DP Role in Corporate Management: 1990*
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Day IV — DESK-TOP/PERSONAL COMPUTER DAY
- *The Executive Work Station*
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Now Multimillion-Dollar Arena

Upkeep, Repair Firms Eye Healthy '82

By Robert Batt
CW West Coast Bureau

While 1982 may be a year of uncertainty in some areas of the computer industry, one sector seems assured of a flourishing future — computer maintenance and repair.

Almost unnoticed as vendors — users and the trade press concentrated on the technical aspects of maintenance — the computer repair business has turned into an arena in which hundreds of millions of dollars change hands every year. Take the multinational conglomerate TRW, Inc., for example.

Employing 3,000 people in the maintenance field alone, TRW is estimated to earn in excess of $100 million per year from its repair business. It has central repair depots in Dallas, Hawthorne, Calif., and Fairfield, N.J., and repairs more than 300,000 assemblies of 11,000 types.

TRW is one of the biggest third-party maintenance houses in the country. It has national maintenance contracts with companies such as Applied Digital Data Systems, Inc., Vector Graphic, Inc., Data Products Corp. and Docutel Corp. It specializes in peripherals, many business systems, magnetic media and memory devices and special-purpose terminals such as those for electronic mail.

Sorbus Specialization

Another third-party house doing well in the maintenance area is Sorbus, Inc., a Pennsylvania-based subsidiary of Management Assistance, Inc. Sorbus' business, located at over 30,000 sites, is one-third comprised of IBM customers, one-third comprised of Basic Four users and the rest consists of OEMs and terminal and peripherals customers.

The company estimates that the total market for repair and maintenance could be as high as $10 billion to $12 billion. The market in which Sorbus specializes — users who have purchased their equipment — is put at around $2 billion.

"We see dramatic growth opportunities in the years ahead for third-party maintenance," Marvin Venable, Sorbus vice-president of marketing, said. "The declining cost of hardware has made computer power available to more people and it is becoming easier and cheaper to acquire systems. This in turn boosts the demand for maintenance."

As microcomputers infiltrate the big corporations, Venable said, so demands for different kinds of service capabilities will arise, such as on-site maintenance or carry-in service at repair depots, depending on the urgency of the problem.

But it is not only third-party maintenance houses that are reaping the benefits of this booming trade. Manufacturers themselves are experiencing rapid growth, particularly fairly new vendors such as the manufacturers of IBM plug-compatible mainframes, which have been around long enough to establish a secure service base.

"A lot of servicing pricing has traditionally been based on value rather than cost," one industry analyst commented. "Only recently have these companies started treating their maintenance depots as profit centers."

Dick Warmington, manager for the computer support division at Hewlett-Packard Co., said, "It is important to set up profit and loss responsibility in order to generate the funds to finance the growth of service operations through research and development and the marketing of service programs. We treat our services as if they were products."

Business Growing

Warmington claimed that the maintenance and repair business at HP is growing faster than the sale of products and is expected to increase as a proportion of overall revenues. Currently, HP maintenance and support generates 15% to 20% of overall computer sales.

Support services are now considered such a vital part of a company's abilities to sell its products that both vendors and third-party operators are in keen competition to provide the fastest, most reliable service.

Response times of between two and four hours are typically claimed as the average response time by many companies.

HP, for instance, with 200 offices around the world, claims a maximum response time of four hours for a problem occurring within 100 miles of an office. In addition, the company has two repair centers — at Roseville, Calif., and Grenoble, France.

Data General Corp. is another vendor experiencing rapid growth in this area. The company has three logistics centers in Colorado Springs, Colo., Westboro, Mass., and Framingham, Mass. These centers service the DG field engineering operations around the nation, repairing systems, printed circuit boards, terminals and data storage devices.

An Area of Strong User Concern

By Robert Batt
CW West Coast Bureau

Hewlett-Packard Co. conducts an annual survey of its customer base in which it asks users to identify their main areas of concern. From this survey, the company has concluded there is no doubt that emphasis on maintenance and repair is well placed because customers identify reliability, overall system performance and hardware support as the top three items on their agendas.

From the vendors' and service houses' points of view, the challenge has been to provide a reliable support service that can answer customer needs and, at the same time, is competitive.

With labor costs rising on an average of 12% to 14% a year over the past five years, the service and support divisions have been looking to control their costs, particularly labor costs. As a result, much emphasis is being put on remote diagnostics.

HP, for example, makes extensive use of its Series 3000 business system as a maintenance tool. The system, containing remote diagnostic facilities, is used on a local basis to duplicate the user's systems console. This, HP said, allows it to run diagnostics as if the engineer were at the user site.

The HP engineers themselves use the HP 85 personal computer as a universal diagnostic tool. By plugging the computer containing diagnostic facilities into disk drives, the company claims it allows for standardizing on diagnostics. The remote diagnostic market is estimated to be going up at around 20 cents a year. Self-maintenance programs with central repair backup are becoming increasingly popular.

In recent years, the growth

(Continued on Page 132)

Japan Opens Another Front in Battle for U.S. Market

By Bohdan O. Szuprowicz
Special to CW

Recent announcements by Toshiba and Panasonic Co. about their intentions to introduce and sell personal computers in the U.S. may be the best indication yet about how the Japanese computer industry is planning to conquer new information processing export markets in the U.S. and elsewhere in the world.

Japanese computer hardware production is already the second largest in the world and growing at a rate of about 25% annually. For the second year running, during 1980, Fujitsu Ltd. has outsold IBM Japan in its home market, giving a great boost to Japan's confidence that its DP industry is well on the way to challenging IBM in world markets as well.

Catching up with IBM in Japan has now become a feasible target for Japanese computer manufacturers. Hitachi Ltd., the second largest hardware manufacturer, is well on its way to reaching the same goal. Nippon Electric Co., presently the third largest Japanese computer manufacturer with 1980 DP sales of $1.1 billion, is even more enthusiastic. As a solidly based telecommunications equipment company with an established global marketing network, it is now boasting of overtaking Hitachi within a year, and even Fujitsu within five years, to become the "numero uno" of Japanese DP hardware manufacturing.

Each of the three Japanese computer manufacturers already has more general-purpose machines installed in Japan than IBM, although IBM is still leading in volume of sales.

The remaining Japanese manufacturers — Oki , Mitsubishi and Toshiba — are rapidly catching up with Sperry Univac, which is the fifth largest supplier in Japan. They have practically overtaken Burroughs Corp. and left NCR Japan well behind. But while the Japanese computer manufacturers may be winning battles against IBM in Japan, confronting the computer super giant in its home territory is clearly still out of their league and will remain so for a long time to come.

Nevertheless, the Japanese manufacturers appear to be planning their offensive in the emerging market of personal and very small computers. Their expectation, not unfounded by market trends, is that these small machines will eventually replace the minicomputers.

The market, which is already estimated at $2.6 billion worldwide, is growing at 40% per year, faster than any other DP hardware segment. The Japanese are confident because they have already been extremely successful in consumer electronics and the personal computer looks to them

(Continued on Page 135)

Maintenance: An Area of Strong User Concern

(Continued from Page 131)

of mixed-vendor shops resulting from the rapid rise of manufacturers of IBM plug-compatible mainframes has opened the way for third-party maintenance houses to get an increasing share of the repair market. Sorbus, Inc., for example, a division of Management Assistance, Inc., does around one-third of its business with users who have purchased IBM equipment ranging from the 370 to the System/34 and System/3.

Since many IBM users start out either leasing or renting their equipment, Sorbus does not come on the scene until a substantial used market is in operation. Thus, the company has yet to enter the 4300 field.

Nevertheless, with 28,000 customers, the company has been doing a healthy business. Growth rates of 15% to 20% a year are the norm, and according to Marvin Venable, marketing vice-president of Sorbus, there is a lot of maintenance work available in the IBM field. "We see tremendous growth in the IBM arena in the years ahead," he said.

As the number of mixed-vendor sites increases, vendors are beginning to look at dual-sourcing their maintenance requirements, for it is becoming clear that no one manufacturer can adequately maintain a complete network.

John Harnett, director of planning and development at TRW, Inc., commented, "There are situations when the vendor should be thinking of adopting a parallel service organization, particularly where the vendor is trying to sell some of its equipment through distributors."

Large-systems builders and integrators, he said, were putting together a great number of components.

"There is now some recognition by vendors who have traditionally had their own service facilities that it might be useful to have a parallel arrangement. We have been quite successful in joint marketing arrangements with vendors to provide maintenance," he added.

Accompanying this development has been a quite radical change in methods of products distribution. Nowadays, many manufacturers, integrators and assemblers are selling some of their products into distribution and dealer networks, rather than setting up their own maintenance systems.

This has certainly benefited the independent maintenance organizations like TRW, which now have client relationships with the dealers themselves. TRW keeps the distributors up to date with the products it maintains. This, in turn, encourages the vendors to use TRW's services because, in doing so, it knows the service organization is dealing directly with its customers.

Such developments, combined with technological advance in the maintenance area, are providing service and support groups with new and expanding opportunities to increase revenues and augment the influence of the maintenance function within corporations.

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Mergers & Acquisitions

EG&G, Inc. will acquire **Gamma Scientific, Inc.** for an undisclosed cash amount under the terms of a recently announced agreement.

Data Card Corp. has reached a formal agreement to purchase **Laserdyne Corp.** through an exchange of 777,000 shares of Data Card stock. The agreement is still subject to certain conditions.

Kierulff Electronics, Inc. has acquired newly authorized distributorships that triple its current inventory of Motorola, Inc. semiconductors, microprocessors, development systems, bipolar, discrete and MOS devices.

Computer Sciences Corp. will acquire, through a merger, all of the outstanding shares of **Associated Credit Services, Inc.** of Houston.

Cipher Data Products, Inc. has agreed in principle to acquire all assets of the **Memory Products Division** of **Perkin-Elmer Corp.** for an undisclosed amount.

Omnilease Corp. has been acquired for cash by **Equico Lessors, Inc.**, a wholly owned subsidiary of **The Equitable Life Assurance Society of the U.S.**

Quasar Systems Ltd. of Canada has recently acquired the **Palo Alto Group** of California.

Paradyne Corp. has signed a letter of intent to acquire **Ark Electronic Products, Inc.** for 146,350 shares of its common stock.

Gould, Inc. will acquire **American Microsystems, Inc.** in an exchange of company stock, under the terms of a recent agreement.

AM International, Inc. has completed the sale of its **Micrographics Division** to **Consolidated Micrographics, Inc.** for an undisclosed figure.

WTD, Inc., a computer terminal engineering and design firm, was acquired recently by **Transaction Management, Inc.**, a manufacturer of point-of-sale systems.

The Traveler's Corp. has entered into an agreement to acquire **Engineered Business Systems, Inc.** as a wholly owned subsidiary to offer a range of computer products and services to independent insurance agents.

Anaconda-Ericsson has reached an agreement to acquire **Axxa Corp.**, a research and development subsidiary of Citicorp.

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Supershorts

National Semiconductor Corp. is opening a 5-in. Nmos read-only memory (ROM) and custom/foundry wafer fabrication line that will increase National's total Nmos ROM and custom/foundry capacity by 150%.

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Applicon, Inc. has scheduled a special meeting of stockholders to be held in Boston, Jan. 8, to consider the merger of Applicon with a wholly owned subsidiary of Schlumberger Ltd.

— — —

Keydata Corp. has reached an agreement with its creditors' committee on a plan of reorganization. The proposed plan calls for payment of all secured claims and a package consisting of cash, subordinated notes and new common stock for unsecured creditors. For the end of October 1981, Keydata expects to report pretax net income of approximately $1,600,00 on gross revenues of approximately $11 million.

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Amnet, Inc. is the new corporate name of ASI Teleprocessing, a private packet-switching and voice response supplier.

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Data, Inc. has formed a Management Advisory Services Division to provide clients with a vehicle for solving upper-management problems related to information processing.

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Whittaker Medicus has changed the name of its Financial Planning Systems and Operations Planning Systems software product to Mediflex.

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International Harvester Co. has entered into an agreement with the National Aeronautics and Space Administration to develop a computerized geographic information system to forecast agribusiness needs.

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Hewlett-Packard Co. has increased its personal computer operations to full-division status. Based in Corvallis, Ore., these operations were launched two years ago.

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Dynatech Packet Technology has received certification for its X.25 interface from both GTE Telenet Communications Corp. and Tymnet, Inc., attesting to its compatibility with the two packet-switching networks.

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Intel Corp. has established an Original Equipment Manufacturer Microcomputer Systems Division in Oregon and named William Lattin as general manager of the division.

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An applications distribution center has been announced by Texas Instruments, Inc. to expand the range and availability of applications software for its small business systems.

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Corporate Time-Sharing Services, Inc. has changed its name to CTS Services, Inc. It also recently acquired Mini Timesharing, Inc. of Dallas.

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The board of directors at the Association of Data Processing Service Organizations, Inc. (Adapso) has voted to establish a systems integrator/OEM section membership within Adapso.

— — —

Emulog, Inc. has formed Phasar, a subsidiary that will market Emulog's new general-purpose CRT terminal, the Alpha Star.

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Logicon, Inc. announced that a civil suit filed in February 1980 in the Los Angeles Federal District Court by the U.S. Justice Department has been dismissed. The suit sought recovery from Logicon of approximately $1 million in fees paid by the company to a sales firm under a government contract.

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Leasametric, Inc. has moved into the European market with the formation of Leasametric GmbH, a joint venture with Kontron Elektronik, GmbH, West Germany, a large distributor of electronic equipment in West Germany.

— — —

Dixon Doll, president of the DMW Group, and Donald Brown, president of Database Design, Inc., jointly announced the opening of European headquarters in London. Known as DMW Ltd., it will be directed by Doll, James Martin and Tony Carter.

— — —

Gandalf Data Ltd. of Canada has donated data communications equipment valued at $30,000 to Carleton University for a new communications laboratory.

Nickels & Dimes

Auto-Trol Technology Corp. announced approval by its board of directors of a rights offering and intends to purchase one right to purchase one share of common stock for each five shares of common stock held of record on Feb. 5, 1982.

$$$

Itek Corp. announced it will distribute to the holders of its common stock all of the issued and outstanding shares of its wholly owned subsidiary, Camelot Industries Corp.

Distributed Data Processing

The Concept Has Changed!

Read about the changing face of DDP in Computerworld's February 22nd Special Report, "Distributed Data Processing."

Qualified DP/MIS people are expensive and hard to come by. Some companies are coping with this problem by changing the traditional concept of Distributed Data Processing. Functions requiring high-level DP skills are being recentralized, and easy to operate, less intelligent remote job terminals run by people without expensive, unnecessary qualifications are being put into the field. A central processor coordinates the network and performs the more difficult tasks. But, will cutting back on the "fancy functions in the field" really save you enough money? Edited by Tim Scannell and Tom Henkel, "Distributed Data Processing" will address this question as well as important issues such as:

- **Security:** its importance as traffic and networks increase. What approaches to DDP security have users found effective, and where have supposedly fail-safe systems failed?
- **Management aspects of DDP:** as the system grows, so do management problems.
- **DP Personnel:** bringing people up through the ranks *vs.* going outside to fill jobs.

Plus, we'll be taking a look at the DDP philosophical and marketing rivalry—attaching minicomputers to a host computer *vs.* eliminating the host in favor of a network of minis.

If you're a user who watches the trends, you'll want to have the most up-to-date information about DDP and you'll find it in our February 22nd Special Report. And if you're marketing products or services in the DP field, you'll want to make sure your ad is there. Ad close is February 5th. Contact your **Computerworld** salesperson, or call Frank Collins at (617) 879-0700.

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AEA Cites Need for Minorities in Industry

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Calling for a less adversarial relationship between business and government over affirmative action programs, the American Electronics Association (AEA) said recently the electronics industry is too labor intensive and too short of qualified personnel to afford the luxury of discriminating against minorities and women.

"It is in our self-interest to seek out, train and employ talented people of all races and both sexes," AEA Representative Elmo Sanders told a Senate committee Dec. 10. Sanders is vice-president of personnel for Varian Associates, Palo Alto, Calif.

The electronics industry's commitment to equal opportunity "is based on both social conscience and good business sense," according to Sanders. He said "the rapid growth of electronic industries places us in the forefront of employment, which means we need minorities, handicapped individuals and women in order to sustain this growth."

The hearing was one of a series called by the Labor and Human Resources Committee on proposed changes to regulations of the Office of Federal Contract Compliance Programs (OFCCP). The AEA presented comments on the proposal, including suggestions it said would allow OFCCP to streamline at once its operations and promote equal opportunity.

The association said the agency should make a greater effort to help companies comply with equal opportunity programs and spend less time trying to punish those who do not.

"The orientation of OFCCP personnel should be redirected toward technical assistance, education and consultative functions," Sanders said. He called for "good faith negotiations and conciliation efforts leading to fulfillment of contractor obligations."

Contracts & Pacts

Southern Pacific Communications Co. has signed a $100 million contract with RCA Asto-Electronics for the construction of three satellites to be used in its Spacenet communications network.

Burroughs Corp.'s Federal and Special Systems Group has been awarded a $12 million contract by the Defense Logistics Agency and the Defense Logistics Services Center for the installation of three B7800 large-scale computers.

Valtec Corp., a Philips-M/A-Com Venture company, has received a contract for 30 Model LDM-9500 lightwave data multiplexers from Micro Cource Corp. of New Lebanon, Ohio. Micro Cource plans to install 12 of the multiplexers in a U.S. Steel hot strip mill in Pittsburgh, Pa. as part of an energy management and control application.

North Star Computers, Inc. has received its largest contract to date — a potential $25 million multiyear contract with General Binding Corp. for a number of business systems.

Durango Systems, Inc. is the supplier of desktop computers to Money Concepts Financial Community Planning Centers nationwide, under a recent agreement with Money Concepts International, Inc. of Miami.

ISC Systems Corp. has signed an agreement to supply its financial terminal systems to Citicorp Associates, Inc., a subsidiary of Citicorp.

Nanodata Computer Corp. has signed a $1 million-plus contract with Microcomputer Systems Corp. for its MSC-1240 and -1245 controllers to interface its QMX systems directly to IBM-compatible and storage module-type disk drives.

The U.S. Small Business Administration (SBA) has selected Decision Data Computer Corp. to maintain its nationwide Data Communications System Network, which links nearly 100 SBA offices through out the country. The contract is valued at $1.2 million over a three-year period.

The Ultimate Corp. has ordered 180 additional Honeywell, Inc.'s Level 6/43 systems for marketing to end users through its international network of 54 dealers. The recent order, valued at $15 million, brings the total value of Honeywell equipment purchased by Ultimate to $54 million.

Digital Communications Corp. has received an order for five additional time-division multiple-access terminals from RCA American Communications, Inc.

Planning Research Corp. has won two contracts worth a total of $4.4 million from the U.S. Air Force's Rome Air Development Center to provide intelligence data handling systems.

Vector Graphic, Inc. has signed its second-year contract with the General Services Administration (GSA) for the sale of microcomputer word processing and data processing systems and software to federal agencies and their contractors.

Aydin Corp. has received its first order for digital satellite communication time-division multiple-access equipment from GTE Satellite Corp. The order is estimated at $3 million.

Data-Control Systems, a division of General Indicator Corp., has been awarded a contract for its coaxial cable modems, the CCM 200, by the Electronics Division of Avco Corp.

Three Massachusets OEM copmanies, AM/ECRM, BBN Computer Corp. and the 3M Co., have contracted with Cipher Data Products, Inc. to purchase Cipher's vacuum column tape drives. The agreements total $1.4 million.

Cromemco, Inc. has signed a multimillion OEM marketing agreement with the Mitsubishi Rayon Corp. to provide the circuit boards and system software for the Mitsubishi MG80 office/factory computer family.

Racal-Milgo, Inc. has been awarded a contract for 1,100 terminals and approximately 1,000 printers by the Air Force Computer Acquisition Center, Hanscom Air Force Base, Bedford, Mass. The five-year lease contract is valued at $7,388,590 for equipment, installation and maintenance by Racal-Milgo's direct field service organization.

American Microsystems, Inc. (AMI) has signed an agreement with Plessey Semiconductors Ltd. of the UK as a second source for AMI's Combo-Codecs produced for the telecommunications industry.

Decimus Corp. has signed an agreement with Pittsburgh National Bank to enhance data processing services the bank provides to a number of its correspondent banks in a four-state region.

Data Card Corp. and Datakey, Inc. have signed an independent distributor agreement giving Data Card exclusive marketing rights for all Datakey products and systems in Europe, Africa and the Middle East.

Logicon, Inc. has received a $4,047,650 subcontract to participate in developing a maintenance training system for the Air Force E-3A Airborne Warning and Control System (Awacs) data processing and display subsystems. Logicon will participate in the program with JWM Corp., which received a $9.1-million contract from the Air Force System Command's Electronic Systems Division.

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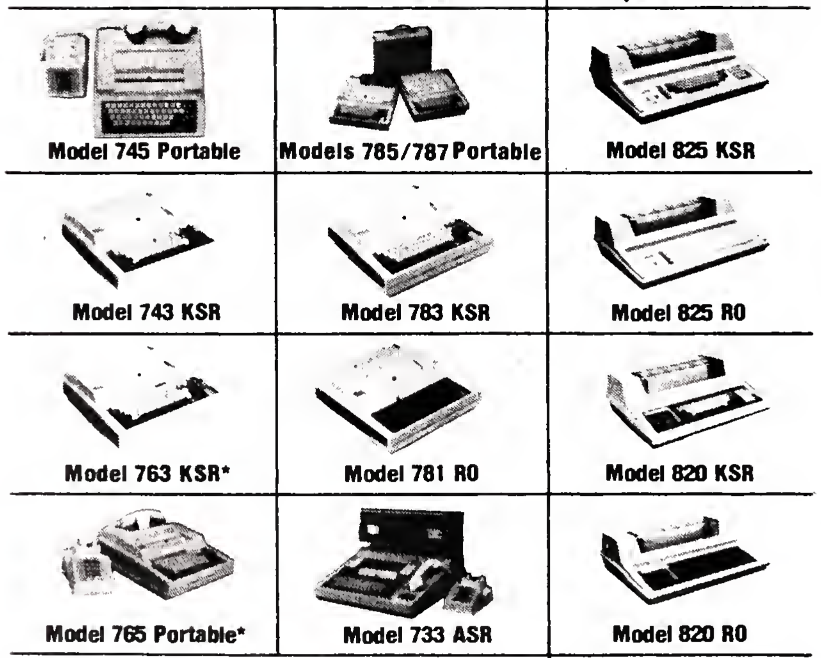

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Executive Corner

Terry Resigns At Lear Siegler

ANAHEIM, Calif. — Bill Terry has resigned as president of Lear Siegler, Inc. Data Products Division after less than three years on the job.

Terry has reportedly resigned to pursue his own business interests and has been replaced by Phil Shires, former vice-president for marketing and sales.

Terry joined the company as national sales manager, before being promoted to vice-president of sales and marketing and then president of the Data Products Division in 1979. He will continue to act as a consultant to the division until Jan. 15. He is not believed to have been offered another job and, according to company spokesman, his resignation "came as a total surprise to everyone, including the new president."

Shires, who joined the company in 1975 as director of operations in charge of manufacturing, has been vice-president of sales and marketing since February 1979.

Other Moves

- James Ziegler has been promoted to chairman of the board of Cylix Communications Network and Ralph Johnson has been promoted to president and chief executive officer at the company.
- Peter Reichert has been named president of Mackintosh Consultants, Inc. U.S.A., a member of the Mackintosh International Group.
- Stephen M. Hicks has been appointed vice-president of marketing for Pansophic Systems, Inc.
- Gary P. Gleason has been named vice-president for corporate growth at Genesee Computer Center, Inc.
- John H. Crawford has been appointed vice-president and general manager of Data General Corp.'s Small Business Systems Division.
- Patrick L. Rickard has been appointed vice-president of product development for NBI, Inc.
- Ron Schubel has joined Molex, Inc. as vice-president of operations.
- Don Wilder has been appointed marketing operations director at Century Data Systems, Inc.
- William T. Hankins has joined Hayes Microcomputer Products, Inc. as director of manufacturing and engineering.
- Craig S. Hill has recently been appointed president of Cortex Corp., and Kimball L. Mason has been named vice-president of marketing at that company.
- Peter J. Shaw has been named president and chief executive officer at Megatek Corp.
- William A. Hotmann has been named to the newly created position of vice-president and general manager at General Terminal Corp.
- Edward Harwood has been appointed vice-president of operations at Gould, Inc., Systems Engineering Laboratories Computer Systems Division.
- Stephen M. Hicks has been named vice-president of marketing at Pansophic Systems, Inc.
- Frank B. Lee has been promoted to vice-president of sales for the Remote Computer Services Division of National CSS.
- Gail R. James has been recently appointed executive vice-president of Strategic Planning at California Computer Systems, Inc.
- Michael J. Connors has been named vice-president of sales at Lexor Corp.
- New appointments at Informatics, Inc. include James R. Porter, vice-president of operations, and Philippe Kuperman, vice-president of finance and administration.
- Zenith Data Systems, Inc. has promoted Thomas Dornback to the position of vice-president, software development, and Robert K. Reid has been named vice-president of marketing. Also at that company, Hoy Ying Chang has been named vice-president, engineering.
- Barry Ross has been named vice-president of sales at Syntrex, Inc.
- Computer Sciences Corp. (CSC) has realigned several senior positions in its Infonet Group. Daniel Toth has been named president of the Commercial Services Division, Thomas L. Hewitt has been promoted to president of the Government Systems Division, Walter A. Collymore has joined the company as vice-president of plans and programs for the Infonet Group and Werner Schaer has been named president of the Systems Development Division. Marvin L. Pulliam will succeed Schaer as president of CSC Computer Sciences Europe.
- Richard Brechtlein has been promoted to marketing vice-president at Century Data Systems, Inc.
- B.H. Purdy Jr. has been appointed vice-president of marketing support at Rexon Business Machines Corp.
- Shaun M. McConnon has joined Cambex Corp. as vice-president of marketing.
- Edward B. Fauvre has joined Dynabyte, Inc. as vice-president of engineering and Lloyd Kreuzer will become vice-president of advanced development.
- Kenneth W. Draeger has been named vice-president of the Data Services Group at Informatics, Inc.

Japan Opens Another Front

(Continued from Page 131)

like another product in that category.

It is now known that IBM moved up the introduction of its own personal computer to August 1981 because it wanted the end user to have a chance to see and feel the IBM product before the Japanese arrived in full force. This in itself is a good indication that the Japanese threat is not taken lightly.

For their part, the Japanese are very serious about becoming a leading computer manufacturing and exporting nation. By the end of the century, computers and information processing are expected to be the world's largest industry after petroleum. This time frame coincides with what is sometimes called in that country as the beginning of the "century of Japan."

Japan, which has practically no natural resources of its own, decided some years ago that its future lies in becoming a force in the "knowledge industries" that depend on advanced technology, automation and a disciplined and educated labor force.

During 1981, Japan was able to capture 10% of the $75 billion worldwide data processing revenues. It is now the single largest competitor to U.S. computer manufacturers, who still enjoy 80% of the global market.

Japan is also now planning to become a leader in other related high-technology industries such as aerospace, electrooptics, lasers, robots, semiconductors, telecommunications and the nuclear industry. Keeping this in mind, it is also taking extraordinary steps to make sure that it can survive the mounting competition for the strategic and critical metals that are so vital to the development of most high-technology industries.

In a recent unprecedented and little publicized move, the Primary Product Committee of the Ministry of International Trade and Industry completed a special study of 22 strategic metals critical to those high-technology industries and recommended the establishment for the first time of a national stockpile in Japan.

Prime Minister Suzuki has already instructed his cabinet to be receptive to such proposals, pointing out that the U.S. and Germany, which are considered main competitors in high-technology markets, already have three-year and one-year strategic materials programs, respectively.

Envisaging mounting competition in the future and already involved in endless trade disputes, Japan is taking no chances and wants to make sure its critical high-technology materials supplies are secure. Considering the huge investment that such a stockpile will entail, it is well to keep it in mind as an indication of how serious the Japanese really are about developing and maintaining a leading position in the computer and other high-technology industries.

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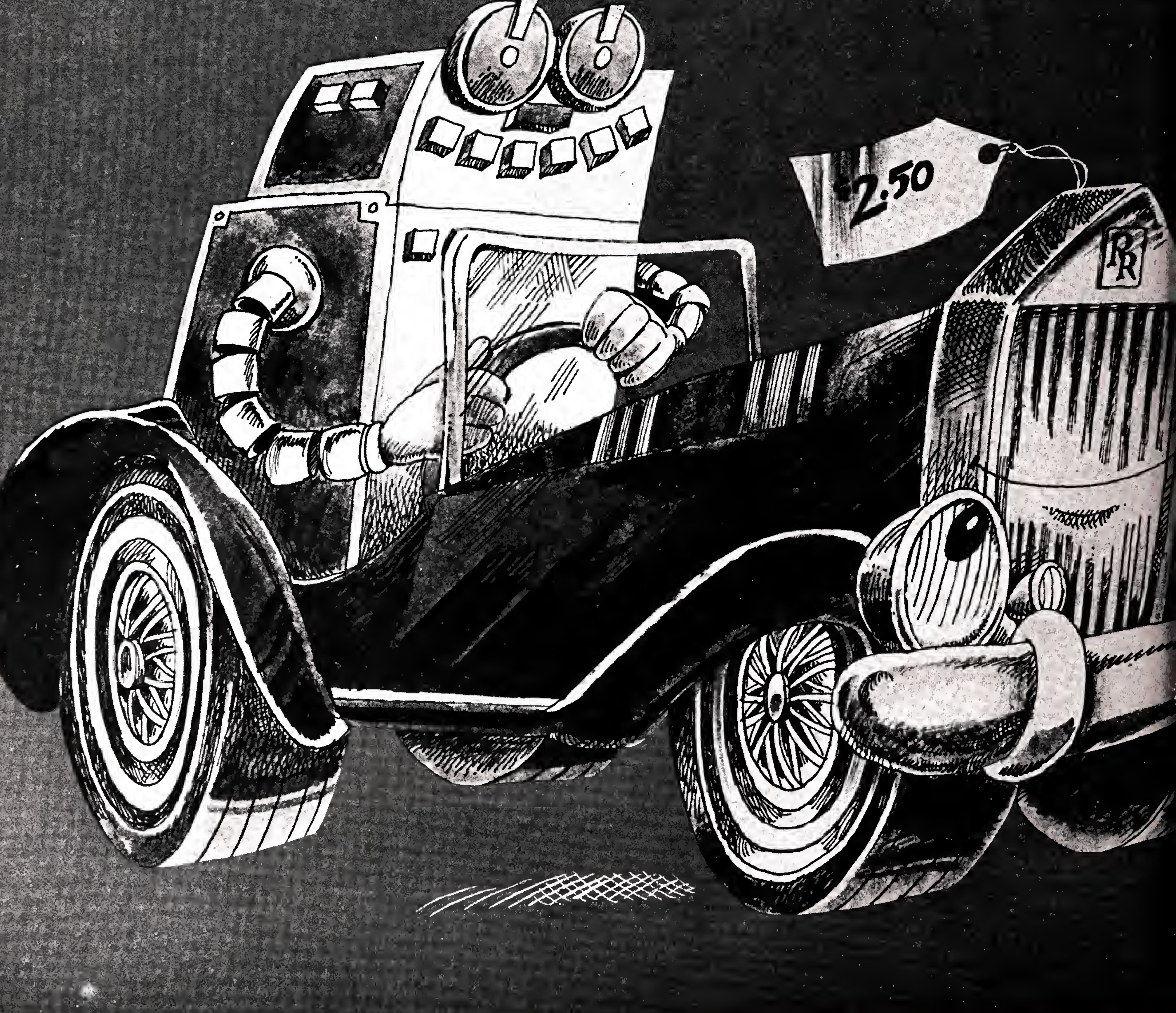

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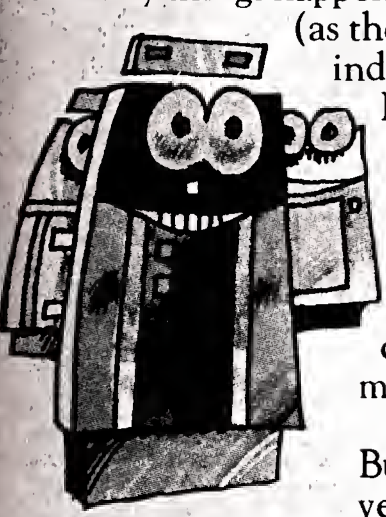
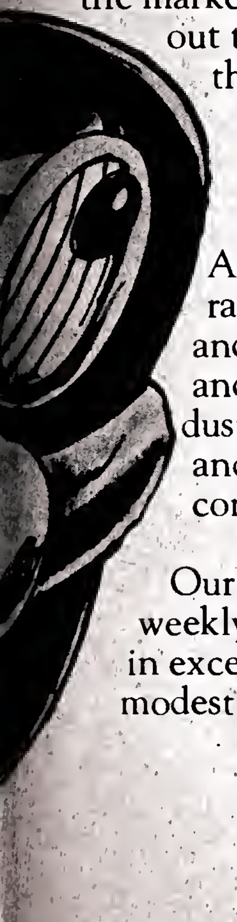
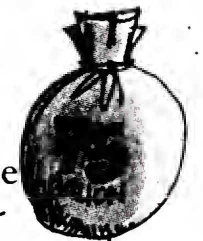
Most of our publications are weekly newspapers, because so many things happen so rapidly in the computer business (as the headline quote from a prominent industry executive makes so clear). In only thirty years the industry has gone from the development of the giant Eniac system, through the tube-powered, water-cooled Univac I (the world's first business computer), to the incredibly cheap, battery-powered microprocessor.



But as unbelievable as the last 30 years have been, the next 30 will probably be even more incredible. In the next two years alone, installed power of general purpose computer systems will grow almost as much as it did in the previous 16 years. And the supercomputers of the 90's will transfer data at a rate several hundred times faster than even today's speedy computers! It's hard to remember this is real science, not fiction.

This extraordinary increase in efficiency has led to a rapid expansion in computer use, as human ingenuity finds more and more applications for these powerful tools. So the market for computer products and services has turned out to be more elastic than most observers had thought. Worldwide expenditures are currently at $90 Billion, and growing by 20% a year.





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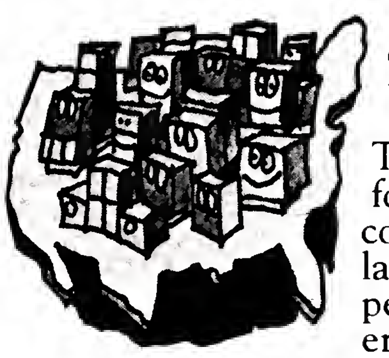

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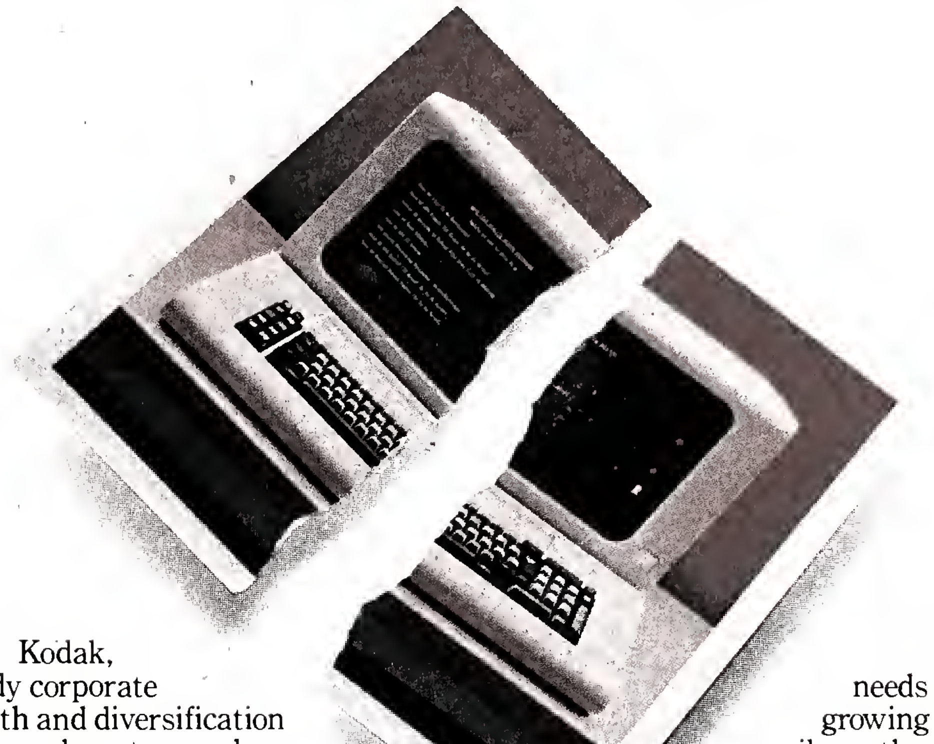

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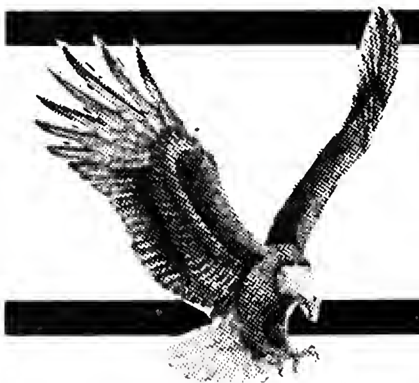

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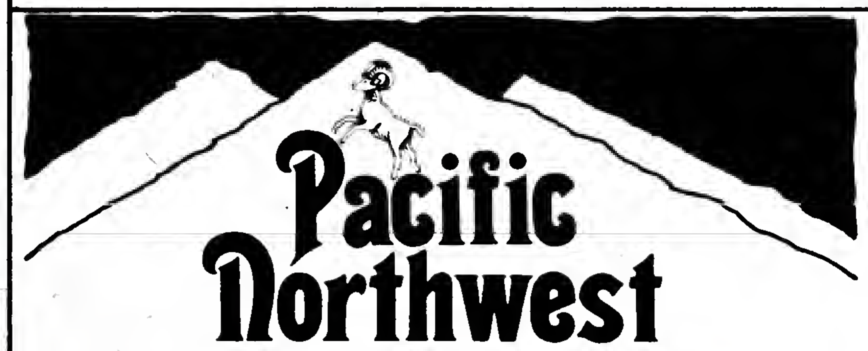

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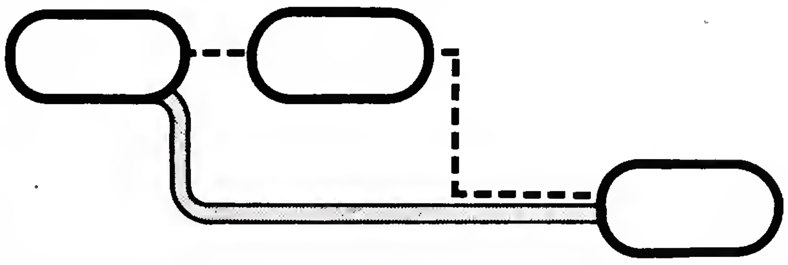

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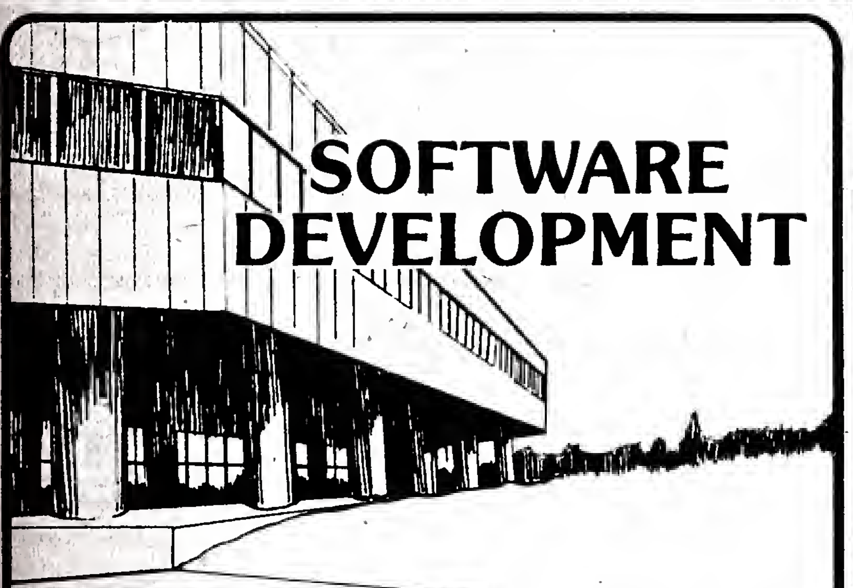

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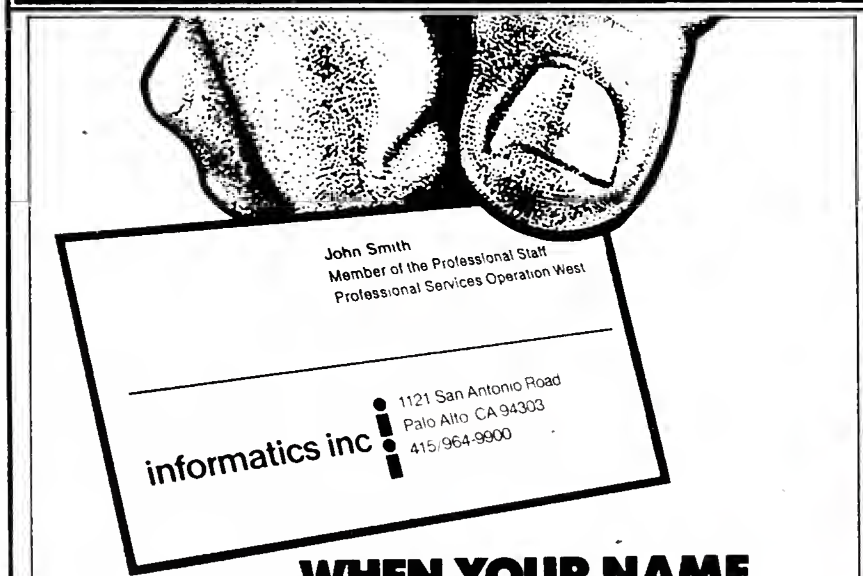

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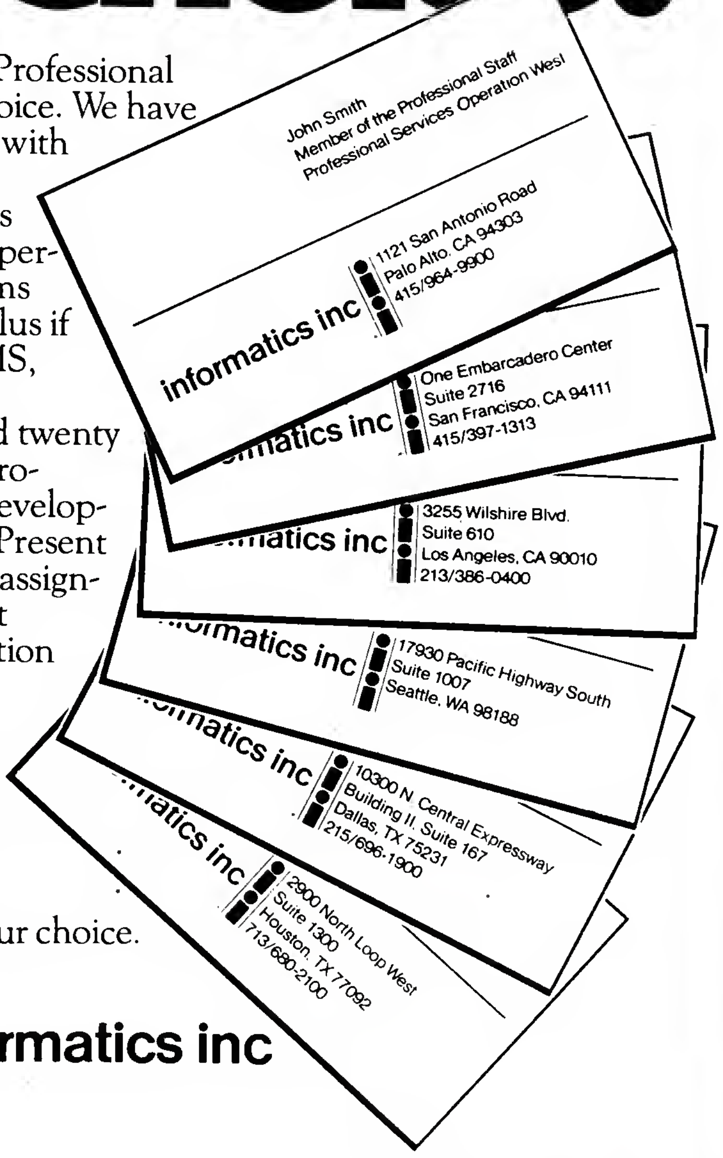

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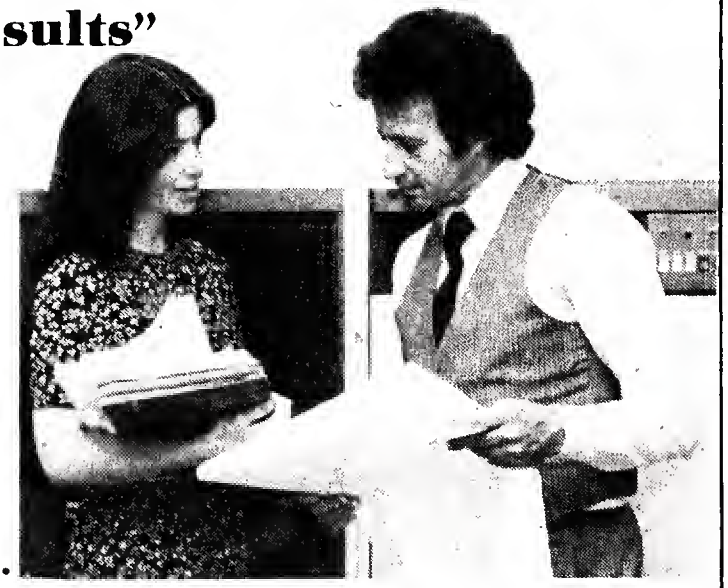

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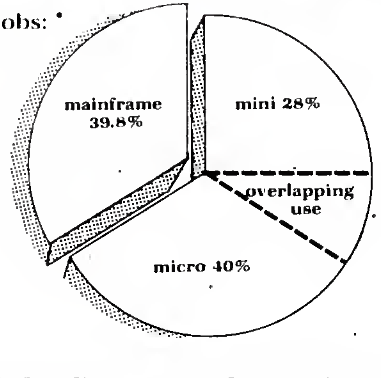

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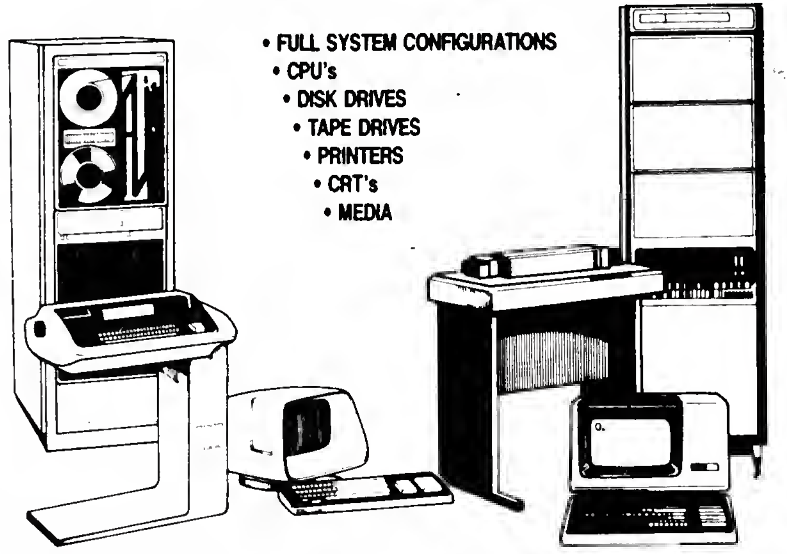

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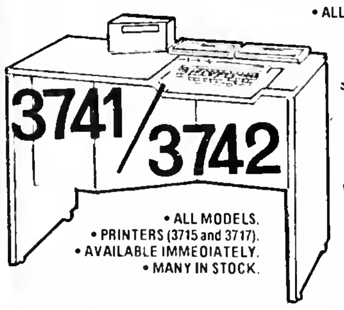

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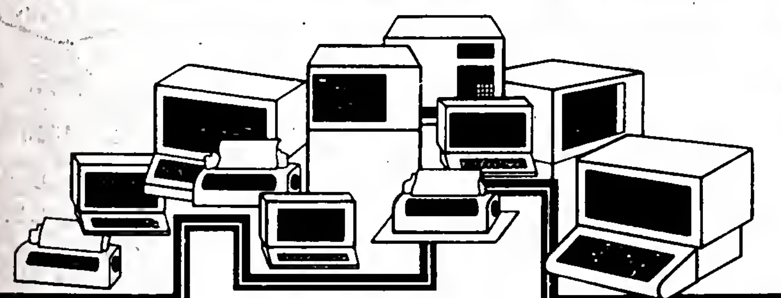

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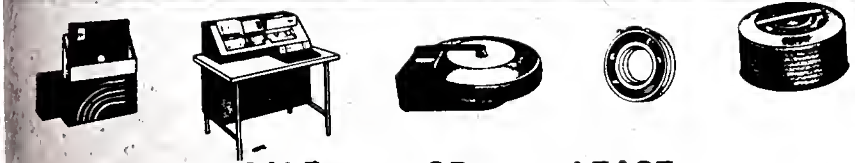

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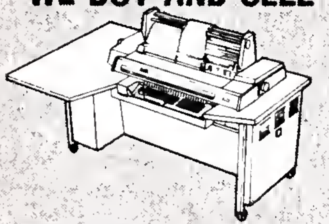

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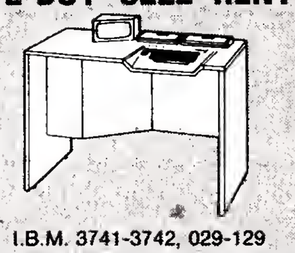

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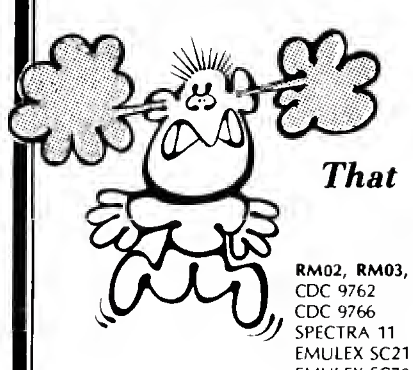

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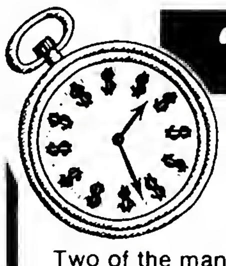

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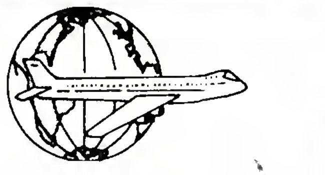

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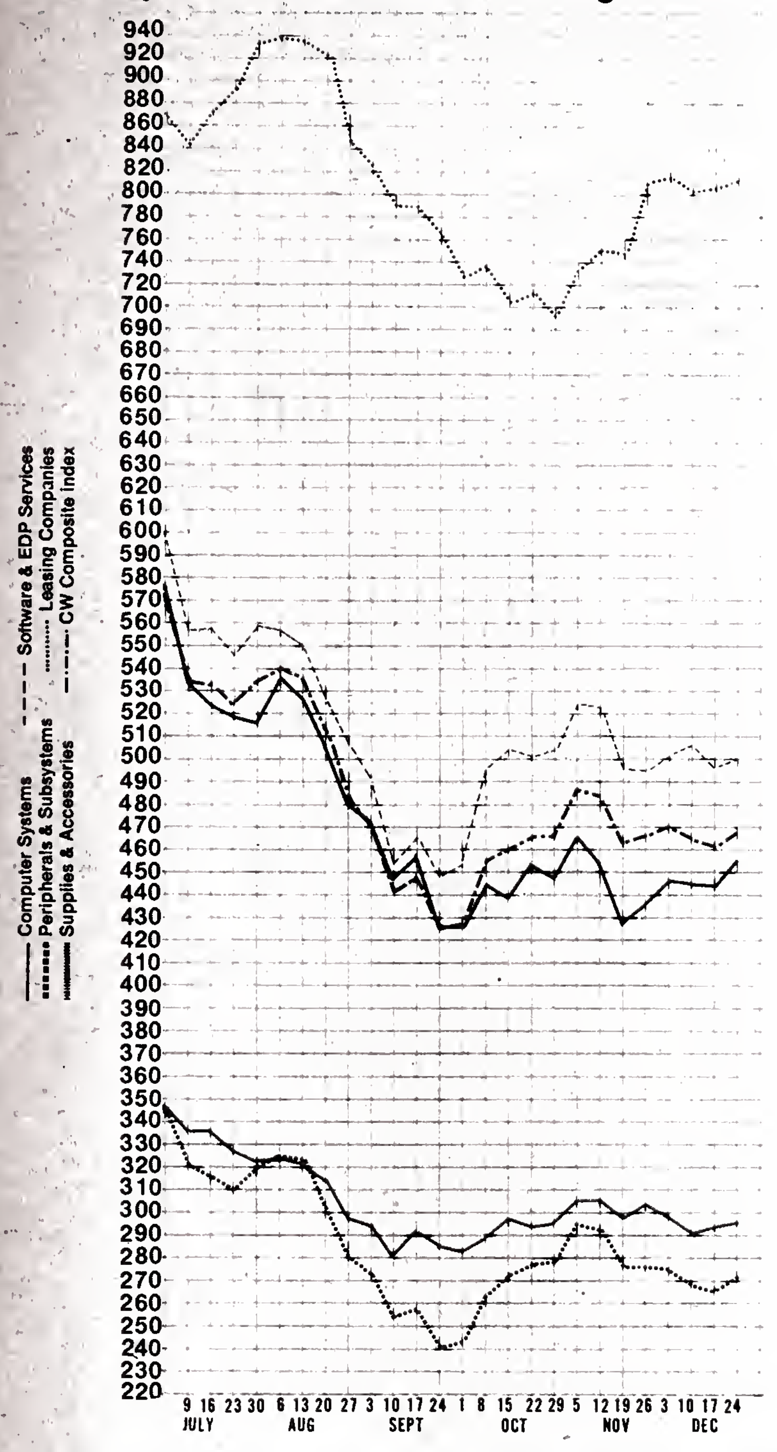

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, DECEMBER 23, 1981

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1980-81 RANGE (1)	CLOSE DEC 23 1981	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	23- 46	28 3/4	+1 3/8	+5.0
N	BURROUGHS CORP	28- 72	34 1/8	- 1/4	-0.7
O	COMPUTER AUTOMATION	9- 28	10 1/4	- 1/4	-2.3
N	CONTROL DATA CORP	19- 42	36 1/8	- 1/2	-1.3
N	CRAY RESEARCH INC	29- 49	37	-1 1/8	-2.9
N	DATA GENERAL CORP	42- 87	55 1/8	- 1/2	-0.8
N	DATAPOINT CORP	40- 68	50 3/4	+3 1/4	+6.8
N	DIGITAL EQUIPMENT	80-113	85 3/4	-1	-1.1
A	EECO INC	7- 19	7 7/8	+ 1/2	+6.7
N	ELECTRONIC ASSOC.	5- 13	6 5/8	+1 1/8	+20.4
N	FOUR-PHASE SYSTEMS	18- 46	40 1/2	+2 1/2	+6.5
N	FOXBORO	42- 62	52 5/8	+2 1/2	+4.9
O	FULCRUM COMP GRP	1- 3	3/8	0	0.0
O	GENERAL AUTOMATION	6- 16	6 1/8	0	0.0
N	HARRIS CORP	39- 60	39 1/2	+ 3/8	+0.9
N	HEWLETT-PACKARD CO	33- 54	39 3/4	- 1/4	-0.6
N	HONEYWELL INC	70-115	71 1/4	+ 3/4	+1.0
N	IBM	49- 73	56 1/8	+2	+3.6
O	MAGNUSON COMP SYSTS	10- 32	11 1/4	- 3/8	-3.2
N	MANAGEMENT ASSIST	11- 26	11 1/2	+ 1/2	+4.5
O	MINI-COMPUTER SYST	1- 4	7/8	0	0.0
N	MODULAR COMPUTER SYS	7- 32	9 3/8	+1 1/8	+13.6
N	MOHAWK DATA SCI	11- 32	15 3/8	- 1/8	-0.8
N	NCR	39- 76	43 1/4	+2	+4.8
N	PRIME COMPUTER INC	18- 49	24 1/4	+ 3/4	+3.1
N	PERKIN-ELMER	21- 36	26	-1 1/4	-4.5
N	SPERRY CORP	30- 65	35 7/8	+1 1/4	+3.6
O	TANDEM COMPUTERS INC	13- 35	27 3/4	0	0.0
N	TEXAS INSTRUMENTS	75-151	81 3/8	+3 1/8	+3.9
A	WANG LABS.	23- 46	28 3/8	+1 7/8	+7.0

LEASING COMPANIES

EXCH		PRICE 1980-81 RANGE (1)	CLOSE DEC 23 1981	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE FINANCIAL CP	18- 29	23	0	0.0
N	COMDISCO INC	16- 25	25	+1	+4.1
O	COMMERCE GROUP CORP	1- 2	1 1/8	0	0.0
O	COMPUTER INVSTRS GRP	1- 4	1/4	0	0.0
O	CONTINENTAL INFO SYS	4- 9	5 1/4	+ 1/4	+5.0
A	DCL INC	3- 4	3 3/4	+ 1/8	+3.4
N	DPF INC	5- 13	10 3/4	- 3/8	-3.3
O	ITEL	1- 15	3/4	0	0.0
O	LEASPAC CORP	1- 2	1/8	0	0.0
N	RELIANCE GROUP INC	65-100	95 1/4	-1 3/4	-1.8
N	U.S. LEASING	18- 30	25 1/4	+ 7/8	+3.5

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SOFTWARE & EDP SERVICES

EXCH		PRICE 1980-81 RANGE (1)	CLOSE DEC 23 1981	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	2- 6	2 1/2	0	0.0
O	ADVANCED SYSTEMS INC	10- 15	14 1/2	+ 1/2	+3.5
O	ANACOMP INC	11- 19	12	- 1/8	-1.0
O	ANALYSTS INTL CORP	3- 14	7 1/4	0	0.0
A	APPLIED DATA RES.	13- 25	20 3/8	0	0.0
N	AUTOMATIC DATA PROC	22- 32	25 5/8	- 5/8	-2.3
O	CGA COMPUTER ASSOC	4- 25	5	- 1/2	-9.0
O	COMPUTER HORIZONS	1- 5	3	0	0.0
O	COMPUTER NETWORK	4- 9	4 1/4	- 1/4	-5.5
N	COMPUTER SCIENCES	12- 30	12 7/8	+ 3/8	+3.0
O	COMPUTER TASK GROUP	11- 23	12	- 3/4	-5.8
O	COMPUTER USAGE	2- 10	3 1/2	+ 1/2	+16.6
O	COMSERV CORP	9- 16	15 1/4	+ 1/4	+1.6
D	COMSHARE	7- 21	7 1/2	0	0.0
O	CULLINANE DATABASE	15- 37	34 1/2	+1	+2.9
O	DATA DIMENSIONS INC	0- 4	1/4	+	+32.9
O	DATATAB	1- 4	1 3/4	- 1/8	-6.6
O	DSI CORP	4- 9	5 1/4	- 1/8	-2.3
O	DYATRON CORP	3- 11	3 5/8	+ 1/8	+3.5
N	ELECTRONIC DATA SYST	15- 30	25	+ 3/4	+3.0
O	INFORMATICS INC	17- 34	25	-2 1/4	-8.2
O	INSYTE CORP	1- 3	2	0	0.0
O	IPS COMPUTER MARKET.	1- 4	1	0	0.0
O	KEANE ASSOCIATES	4- 8	4 1/2	- 1/4	-5.2
A	LOGICON	23- 38	31 3/8	+ 1/4	+0.8
O	MNGT SCI AMER INC	17- 26	22 1/2	- 1/2	-2.1
O	MATHEMATICA INC	12- 24	21	- 1/2	-2.3
O	MATHEMATICAL APP GRP	15- 28	18 1/2	+1	+5.7
O	NATIONAL DATA CORP	14- 28	19 7/8	+ 1/8	+0.6
N	PLANNING RESEARCH	5- 13	5 3/4	0	0.0
O	PROGRAMMING & SYS	1- 2	1 1/8	0	0.0
O	RAPIDATA INC	5- 16	15 1/2	+ 1/8	+0.8
O	REYNOLDS & REYNOLD	16- 26	20 1/4	- 1/4	-1.2
O	SEI CORP	17- 28	24 1/2	+1 1/4	+5.3
O	STSC INC	7- 28	7 3/4	+ 1/4	+3.3
O	SCIENTIFIC COMPUTERS	8- 16	8 3/4	- 1/4	-2.7
O	SOFTWARE AG	11- 23	13 1/2	- 1/2	-3.5
N	TYMSHARE INC	23- 58	28	+1 1/2	+5.6
A	URS CORP	11- 18	13 3/8	0	0.0
N	WYLY CORP	7- 20	8	0	0.0

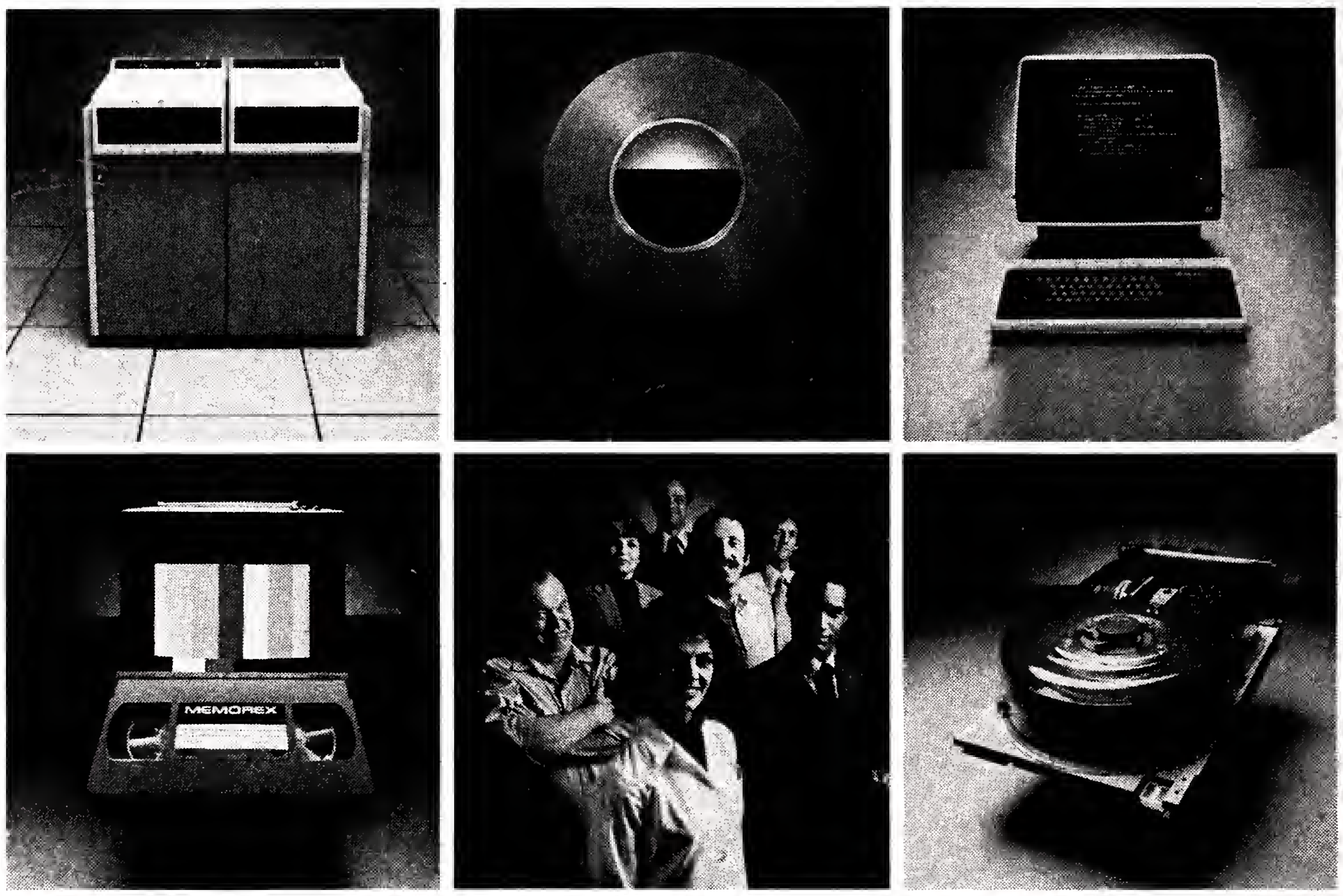
PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1980-81 RANGE (1)	CLOSE DEC 23 1981	WEEK NET CHNGE	WEEK PCT CHNGE
N	AM INTERNATIONAL	4- 25	3 7/8	- 1/8	-3.1
A	ANDERSON JACOBSON	10- 26	12 1/2	- 1/4	-1.9
O	AUTO-TROL TECHNOLOGY	10- 62	10	- 1/4	-2.4
O	BANCTEC INC	20- 35	32 1/2	+1	+3.1
O	BEEHIVE INT'L	6- 18	8 7/8	+ 3/8	+4.4
A	BOLT,BERANEK & NEW	9- 25	9 3/4	- 1/4	-2.5
O	CAMBEX CORP	2- 9	3	+ 1/4	+9.0
N	CENTRONICS DATA COMP	7- 40	12 5/8	+1 3/8	+12.2
A	CETEC CORP	4- 9	4	- 1/8	-3.0
O	COMPUTER DEVICES INC	4- 10	7 1/2	0	0.0
O	COGNITRONICS	3- 11	3 1/8	0	0.0
O	COMPUTER COMMUN.	1- 8	3/4	+ 1/8	+18.1
A	COMPUTER CONSOLES	19- 28	22 3/8	+1 3/4	+8.4
O	COMPUTER TRANSCEIVER	3- 9	5 1/2	+ 1/4	+4.7
N	COMPUTERVISION CORP	20- 49	32 3/4	+3 1/8	+10.5
N	CONRAC CORP	17- 28	28	+3 3/4	+15.4
A	DATA ACCESS SYSTEMS	5- 23	6 1/4	0	0.0
A	DATAPRODUCTS CORP	19- 44	22 3/8	+ 5/8	+2.8
O	DATUM INC	2- 5	1 7/8	+ 1/8	+7.1
O	DAVID JAMISON CARLYL	3- 6	6	+ 1/8	+2.1
O	DECISION DATA COMPUT	3- 6	2 5/8	- 1/8	-4.5
O	DELTA DATA SYSTEMS	2- 4	2 1/4	- 1/8	-5.2
O	DATARAM CORP	4- 15	7 1/2	- 3/8	-4.7
N	ELECTRONIC M & M	3- 9	3 1/8	- 1/8	-3.8
O	EVANS & SUTHERLAND	18- 40	30 3/4	-2 1/4	-6.8
O	FABRI-TEK	2- 6	3 5/8	+ 1/8	+3.5
O	GENERAL COMPUTER SYS	1- 12	8	+ 3/4	+10.3
N	GEN'L DATA COMM IND	8- 19	7 5/8	- 5/8	-7.5
O	GENERAL TERMINAL CP	1- 4	3/4	-	-7.0
N	HAZELTINE CORP	19- 35	26 1/2	+ 3/8	+1.4
O	INFORMATION INTL INC	8- 17	10 1/4	0	0.0
O	INTEL CORP	23- 51	24	- 1/2	-2.0
O	IPL SYSTEMS INC	6- 15	7 1/4	+ 3/4	+11.5
A	LUNDY ELECTRONICS	7- 18	9	+ 5/8	+7.4
A	MSI DATA CORP	11- 27	16 3/8	+ 1/8	+0.7
O	NETWORK SYSTEMS CORP	14- 25	21 1/4	- 3/8	-1.7
O	OMEX	2- 12	8	0	0.0
N	PARADYNE CORP	25- 52	40 5/8	+1	+2.5
A	PENRIL CORP	8- 17	8 1/8	- 3/4	-8.4
O	RAMTEK CORP	9- 23	13 1/2	+1	+8.0
N	RECOGNITION EQUIP	6- 21	6 3/8	0	0.0
O	SCAN DATA	1- 5	3/4	0	0.0
N	STORAGE TECHNOLOGY	18- 40	35 3/4	- 1/2	-1.3
O	SYKES DATATRONICS	8- 34	28 1/4	+1 1/4	+4.6
A	T BAR INC	12- 19	12 1/2	0	0.0
A	TEC INC	4- 7	5	- 1/8	-2.4
N	TEKTRONIX INC	46- 70	55	+1	+1.8
N	TELEX	5- 9	6	+ 1/8	+2.1
O	TESDATA SYSTEMS CP	6- 17	7 5/8	+ 1/2	+7.0
A	TIMEPLEX INC	8- 19	8 7/8	0	0.0
O	WILTEK INC	1- 3	2 1/4	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1980-81 RANGE (1)	CLOSE DEC 23 1981	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMERICAN BUS PRODS	11- 17	12 5/8	0	0.0
O	BALTIMORE BUS FORMS	1- 2	1/2	0	0.0
N	BARRY WRIGHT	15- 24	18 1/8	+ 1/4	+1.3
O	CYBERMATICS INC	1- 2	1	0	0.0
A	DUPLEX PRODUCTS INC	12- 17	13 1/4	+1 1/8	+9.2
N	ENNIS BUS. FORMS	15- 23	20 1/4	+ 1/2	+2.5
N	3M COMPANY	48- 65	53 7/8	- 3/8	-0.6
O	MOORE CORP LTD	27- 38	33	+ 3/8	+1.1
N	NASHUA CORP	17- 33	17 5/8	- 1/8	-0.7
O	STANDARD REGISTER	30- 41	34	- 3/4	-2.1
A	TAB PRODUCTS CO	15- 30	16 3/4	- 1/4	-1.4
N	WALLACE BUS FORMS	22- 36	32 1/2	+ 1/8	+0.3

SMALLER. SMOOTHER. FASTER. FINER. THINNER. TOUGHER. SMARTER.



Those words are not mere product boasts. They describe, instead, the relentless realities of doing business in the marketplaces of high technology. Marketplaces with insatiable appetites for ever-smaller sizes, smoother surfaces, closer tolerances, faster accesses, greater capacities. Marketplaces with their own uncompromising process of natural selection.

Memorex® Corporation has been part of that environment since 1961. For 20 years, we have helped to shape the information recording, storage and retrieval industry. For 20 years, we have expanded our product lines to include everything from disc packs to disc drives, from audio and videotape products to communications terminals. And for 20 years, in an environment where change is the constant—and an unsympathetic, ever-accelerating constant at that—Memorex Corporation has done more than simply manage to change so as to keep up. We have *managed change itself* and stayed ahead.

And since ahead is where we intend to stay, we are taking those mandates for smaller, smoother, faster, and the rest and making of them points of pride, "expressions of excellence." Certainly, the accomplishments our people have made possible these past 20 years are noteworthy. And if we are not dwelling on them, it is because excellence, like change itself, moves in only one direction.

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